INSTRUCTIONS FOR USING THE U.S. GEOLOGICAL SURVEY DATA BASE OF WELLS ON LONG ISLAND, NEW YORK

By George W. Hawkins and Gregory M. Terlecki

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FOREWORD

Understandable documentation is necessary for the use of any computer system because it informs the user about the capabilities and proper use of the system. This is especially important when documenting fields in a data base because a user may need to group several different fields in a variety of ways.

This manual documents the well data base of Long Island, N.Y., maintained on computer by the U.S. Geological Survey. To make this manual easy to understand and use, it is divided into 11 sections. Each section presents information on the use of either a specific part of the data base or information that is common to more than one section. Common sections are 1 2, and 7. The reader is cautioned not to read a section without first reading all common sections having a lower number. Additional documentation that is intended only for the data-base manager is not included in this guide but is available in Syosset, N.Y.

Acknowledgments

The well data base and documentation were prepared during 1975-81 in cooperation with the Nassau County Department of Public Works, the Suffolk County Department of Health Services, and the Suffolk County Water Authority.

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CONVERSION FACTORS AND ABBREVIATIONS

Multiply inch-pound units	By	To obtain SI units
foot (ft)	0.3048	meter (m)
inch (in)	2.54	centimeter (cm)

National Geodetic Vertical Datum of 1929 (NGVD). A geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "mean sea level."

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ABSTRACT

The population of central and eastern Long Island, N.Y. depends on ground water for its supply of water. Data on more than 7,500 wells on the island have been collected by various State and local agencies and compiled by the U.S. Geological Survey since 1906.

During 1975-81, the Geological Survey developed a data base for its Data General Nova 1220[1] minicomputer to store and process the well information. The data base is composed of seven sections, each of which may be revised and updated. Three types of magnetic devices with limited capacity are used for data storage--disk, Linctape[1], and 9-track tape. This system makes each section small enough to store and update on a small minicomputer while allowing simultaneous data retrieval from all sections.

This manual gives complete instructions for revising, storing, and retrieving well data. Most programming is in FORTRAN, but some is in assembly language.

[1] The use of trade names is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

SECTION 1

INTRODUCTION TO THE WELL DATA BASE

By

George W. Hawkins

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ILLUSTRATION

TABLE

INTRODUCTION

A data base is a collection of data derived from a variety of sources and stored for ready access by many users.

The U.S. Geological Survey's well data base on Long Island, N.Y., is designed for the storage of the island's well data. These data have been collected by the Geological Survey and cooperating State and local agencies since 1906 (Veatch and others, 1906). The data base is used by Geological Survey personnel to answer requests from office hydrologists, cooperating agencies, and the public.

DESCRIPTION OF WELL DATA BASE

The data base is made up of a series of data files grouped by county or section of a county and maintained on a Nova 1220[1] minicomputer in the Geological Survey's office in Syosset, N.Y. Figure 1-1 depicts the storage media on which the data base resides.

Header-file information is on disk; water-level and hydrogeology data are on Linctape[2], and the proposed pumpage and water-quality subfiles will be on 9-track tape. The proposed well-log subfile has not yet been assigned, and there is one spare subfile.

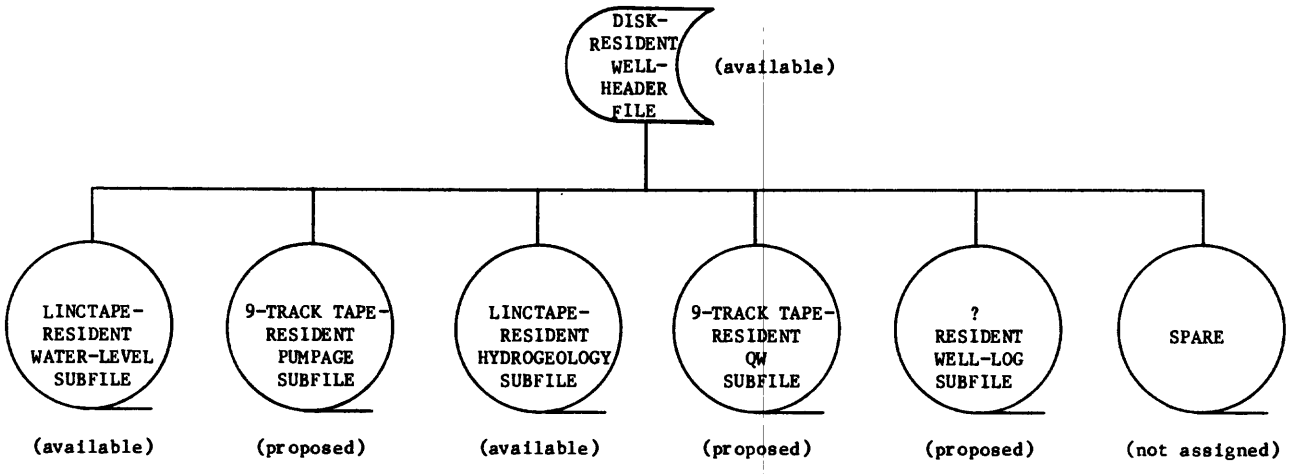

Figure 1-1.--Storage media of well data base for each county or section of a county.

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[1]The use of trade names is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

[2]Linctape is a block-numbered tape that allows positioning to any block without reading the data contained in the intervening blocks.

The disk-resident part of the data base is the well-header file, which is used to control and index up to six subfiles. The name of the Linctape file or 9-track tape, and the location of the subfile data for each well in each subfile, are stored in the well-header file by subfile-update programs as part of the record for each well. This enables programs to automatically determine whether and where subfile data for a given well are available and takes advantage of the fast retrieval speed of the well-header file and of the random accessibility of Linctape. The header file also stores site-description and location information that is common to each of the subfiles, avoiding duplication of data. Header-file information can be quickly retrieved and easily updated.

Because the data elements (or fields) that qualified as common information are too numerous to store on disk, they were first reviewed to determine which were the most useful in answering a diversity of requests for information and were then culled to retain only those that depend on the physical characteristics of the well and are not affected by time (for example, latitude-longitude). Most remaining non-time dependent fields were placed in the hydrogeology subfile.

The Linctape and 9-track tape-resident parts of the data base consist of a series of up to six subfiles. These subfiles are used to store specific kinds of additional data for each well.

TERMINOLOGY AND EXPLANATIONS

Some of the terms used throughout this report and several general concepts about the data base are explained below.

Local Well Number or Well Number.--the unique well identifier assigned to a well by the State of New York. Its general form is

Xnnnnnn

where:

X is the county symbol and may be one of the following:

K = Kings County	P = Reserved for USGS use
N = Nassau County	S = Suffolk County
Q = Queens County	W = Reserved for USGS use, and

nnnnnn is a well number between 1 and 999999; for example, N001259.

Local Well and Suffix Number (L.W.S. number).--the unique well identifier assigned by the Geological Survey; the primary well-identification number used to access well information from the data base. Its general form is

Xnnnnnn ff

where:

Xnnnnnn is the local well number (defined above), and

ff is a suffix number from 1 to 99. (Suffix numbers of 90 and above are reserved for future use to handle special problems). An example is N001259 01.

The easiest way to describe the use of the L.W.S. number is to first compare it to the national identifier, called the station identifier. In the Geological Survey's WATSTORE System[1], the latitude and longitude of the well, in degrees, minutes, seconds, and a sequence number, form a unique station or site identifier. The latitude and longitude can be used to assign a unique number to any location on earth to the nearest second, but the nearest second can define the location of a site only within 80 feet on Long Island. Thus, a two-digit sequence number is appended to the latitude and longitude numbers to identify up to 99 different sites within that 80-foot range. The sequence numbers do not imply any particular order, nor are they necessarily assigned to wells in chronologic order. In the WATSTORE system, the station identifier is the master identification number for accessing well data, but in the well data base, it is the secondary identification number and may be used only for data retrieval. The sequence number of a station identifier in the well data base may not exceed 63 because only six data bits are used to represent it.

The local well number is intended to identify each well uniquely, but several exceptions have been noted; for example, some numbers represent more than one well, and some represent new wells that have replaced old ones. It was therefore necessary to append a two-digit suffix number to each local well number to identify as many as 99 different wells having the same local well number. The resulting local well and suffix number is the primary master identification number for accessing well data in the well data base.

No numerical correspondence between sequence number in the station identifier and suffix number in the L.W.S. number is implied. The suffix numbers of the L.W.S. numbers do not imply chronologic order and need not be assigned to wells in chronologic order.

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[1]/The Geological Survey's National Water Data Storage and Retrieval System (WATSTORE) is operated and maintained on the central computer facility of the Survey at its National Center in Reston, Va., and through approximately 50 terminals in Water Resources Division offices in major cities throughout the country.

Nontransparent Data Field.--an item of data that may be entered into the well data base by a user. A list of the nontransparent data fields in each file of the well data base is provided in the coding instructions for each file.

Transparent Data Field.--an item of data that is entered into the well data base by one or more programs for internal file-control. Some of these data are available to the user for retrieval. A list of the transparent data fields in each file of the well data base is provided in the coding instructions for each file.

Card Type.--a one-character numeric or alphabetic code on each input card. This code identifies the kind of data contained on the card.

Transaction Code.--a one-character numeric or alphabetic code on each input card that tells the update program what action is to be taken upon encountering the card.

Subfile Code.--A one-character alphabetic code on each input card (subfiles only) that determines the subfile to which the card applies.

Deletion Box or Field.--a one-column field after most other data fields that allows the information in the field that it follows to be deleted from the data base (blanked or zeroed) by coding a D.

ASSIGNMENT OF LOCAL WELL AND SUFFIX (L.W.S.) NUMBERS

Assigning an L.W.S. number to a well is as critical as assigning a station identifier, and the L.W.S. number is difficult to change once it has been assigned. The Geological Survey assigns only the last two digits of the L.W.S. number; the first seven are assigned by the State of New York. Therefore, when a new L.W.S. number is assigned to a well, the well-header file should first be checked to determine which suffix numbers are available and to insure that the new L.W.S. number is not being assigned to a well that already has one.

When an L.W.S. number is assigned to a well having the same local well number as another well (that is, both wells are operational at the same time), the new well needs to be assigned a suffix number starting with 51 to avoid later confusion with any replacements of the first well. The number 51 was chosen because it is the midpoint of the suffix numbers, and it is unlikely that more than two wells with the same local well number will be operational at the same time.

CODING LOCAL WELL AND SUFFIX NUMBER

The L.W.S. number is the master key to the well data base and is coded in columns 1-10 on each card as shown in the following table. The L.W.S. number is checked extensively by update programs for improper coding or ambiguity to avoid processing the wrong well.

Column	Contents/instructions
1	County letter of local well number. K, N, P, Q, S, or W are acceptable.
2 - 7	Numeric part of local well number (right justified). Leading zeros may be omitted.
8	Must be blank.
9 - 10	Suffix number (right justified). Leading zeros may be omited.

DOCUMENTATION OF ERRORS

The well data base and associated programs are relatively new. Although the system has been tested, some discrepancies or inconsistencies may still occur. All program or documentation errors should be reported to the computer unit, and any suspected program errors must be completely documented. Include copies of all input or output and, if describing an update problem, include the previous and current file contents. Also state the problem and the program being used, and describe when the problem occurs.

LOCATION OF DATA FIELDS

The most annoying problem that a new user will confront is determining where to look for information about a field. Table 1-1 is an alphabetical list by field name showing the section and page number of this manual in which each field is described.

REFERENCE CITED

Veatch, A. C., Slichter, C. S., Bowman, Isaiah, Crosby, W. O., and Horton, R. E., 1906, Underground water resources of Long Island, New York: U.S. Geological Survey Professional Paper 44, 394 p.

Table 1-1.--Alphabetical field name and location list.

Field name	Section no.	Page
Accuracy of static and pumping water levels	10	27
Altitude of measuring point	10	21
Bottom of screened interval(s)	3	13
Casing diameter	10	18
Census tract	10	20
Community	3	12
Core samples	10	24
Data available in WATSTORE indicator	3	11
Date completed	10	20
Date of original static water level	10	21
Date of pumping test	10	28
Date of water level measurement	8	12
Depth of well or test hole	10	17
Depth to hydrogeologic units	10	25
Ditch samples	10	24
Driller	10	19
Finish	10	18
Frequency of water-level measurement	8	9
Historic text	7	7
Horsepower	10	22
Hydrogeologic unit	3	13
Land-surface altitude	3	13
Latitude-longitude	3	11
Length of screened intervals	10	19
Lift type	10	21
Lithology of screened zone	10	19
Local well and suffix (L.W.S.) number	1	6
Long Island water-supply application number	10	17
Major drainage basin	3	12
Maximum yield of pump	10	22
Method depth determined	10	18
Method drilled	10	19
Method yield determined	10	27
Multiple screens indicator	3	13
Nonpublic-supply area	10	16
North or South Fork indicator	3	12
Official well-suffix letter	3	11
Original static water level	10	21
Other logs	10	23
Owner's well number	10	15

Table 1-1.--Alphabetical field name and location list (continued)

Field name	Section no.	Page
Ownership of well	10	15
Person correlating top of aquifer	10	23
Person making pumping test	10	29
Physical records available	7	7
Previous well	3	13
Primary log	10	22
Public water-supply area	10	16
Publication text	7	7
Pumping area	3	12
Pumping period	10	28
Pumping-test information available	10	28
Pumping water level	10	27
Recorder-charts-available indicator	8	9
Reliability of correlation	10	23
Replacement date	3	14
Replacement well	3	14
School district	10	20
Screen diameter	10	18
Secondary log	10	22
Sewer district	3	12
Site-description text	3	21
Specific capacity	10	29
Static water level	10	27
Station identifier	3	11
Status flag	3	22
Stream basin	10	20
Surficial geology	10	19
Top of screened interval(s)	3	13
Town	3	11
Type of water-level measurement	8	13
Use of water	10	16
Use of well	3	11
Water level	8	12
Water-level remarks	8	13
Water-supply application number	10	17
Water-table or artesian flag	8	9
Well-field number	10	16
Well owner's name	10	15
Yield during test	10	27

SECTION 2

SUBMITTAL OF DATA TO THE WELL DATA BASE

by

George W. Hawkins

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ILLUSTRATIONS

INTRODUCTION

This section describes (1) the procedure for submitting data for the well data base to the computer section of the Geological Survey's Long Island office for processing, and (2) the printouts that will be returned. Data are considered ready for submittal to the data base when they are punched onto cards according to the coding instructions for the appropriate file, although card images from other sources, such as tape or disk, are also acceptable.

The flow of all data is shown in the flow chart in figure 2-1; the chapters of this book with which the user should be familiar are indicated on the figure.

CARD-PROCESSING ORDER

It is important to understand the order in which cards are processed by the updating programs. All card decks are processed in the order submitted, and cards in each deck for the well-header file are likewise processed in the exact order submitted.

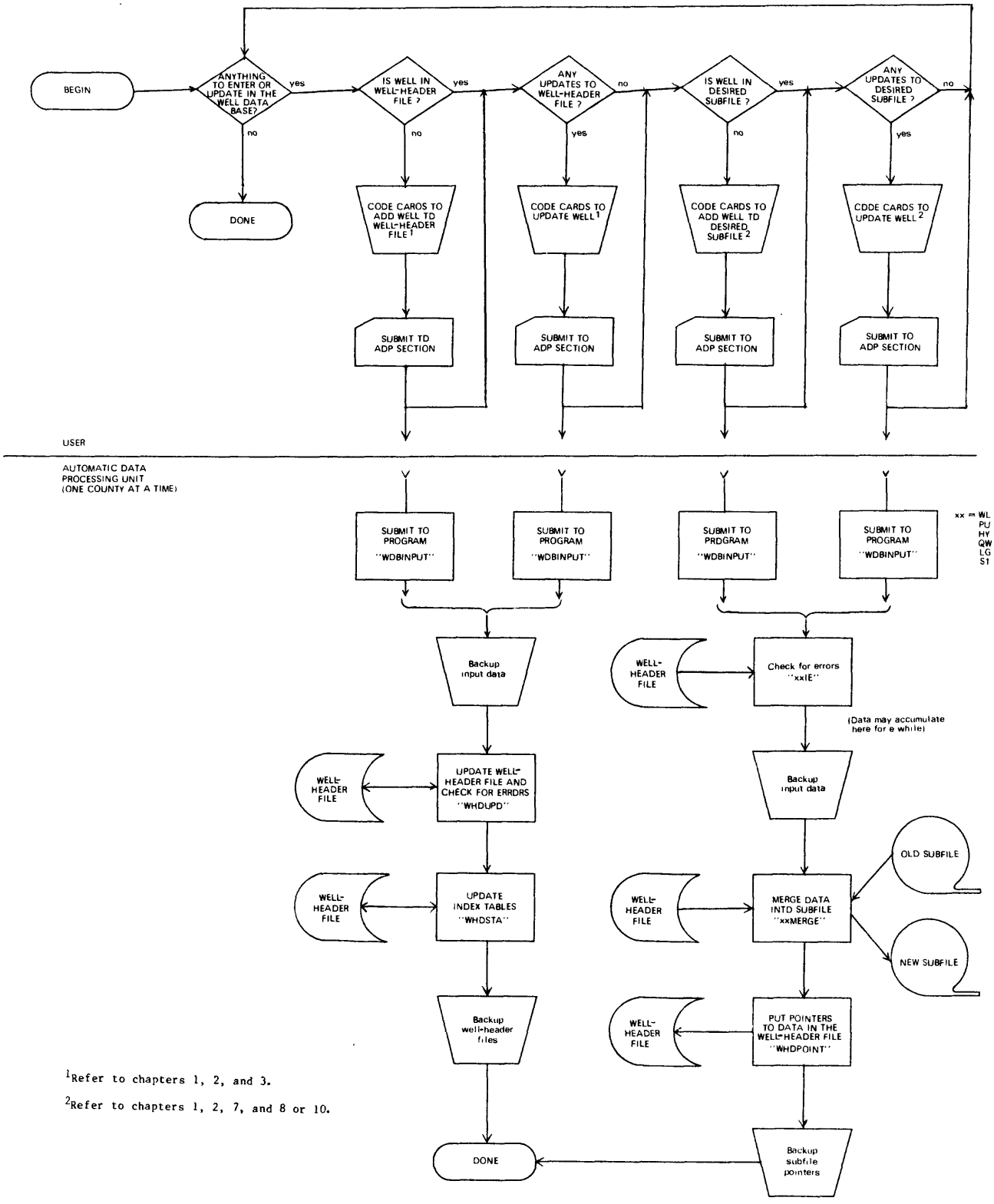
For a subfile, the messages from the input and error-checking program will be produced in the order in which the cards were submitted. All cards going into a subfile merge program are then sorted into ascending order by L.W.S. number, date (if applicable), and line number (if applicable, such as for text cards). When more than one card is submitted to a subfile that affects the same field of data, the cards for that field are processed in the order submitted. Thus, if any given subfile field will be changed only once by the cards within any given deck, and the deck does not contain any cards for the well-header file, the deck could be shuffled into any order without affecting the processing results. A subfile merge report will always be in ascending order by L.W.S. number.

UPDATING PROCESS

Data Submittal

The computer-updating process begins when a card deck for the well data base is submitted to the office computer section for processing. At present, it is best if each deck contains cards pertaining to only one county, or one section of a county if data for that county are on more than one disk. However, cards for the well-header file or any of the subfiles may be mixed in the same deck.

The computer section will first print the card deck and enter it into the well data base input program WDBINPUT, through which all input to the well data base must pass. This program generates a report titled "WELL DATA BASE INPUT ERROR REPORT FOR (date). RETURN OUTPUT TO USER = (deck name)." The program checks only the L.W.S. number and file destination (column 79 for subfiles, column 80 for the well-header file). All rejected cards are printed along with the reason for rejection.



[1]Refer to chapters 1, 2, and 3.

[2]Refer to chapters 1, 2, 7, and 8 or 10.

Figure 2-1.--Flow chart showing well data base input/check/update and backup process.

The program is first run in a check-only mode. This allows the operator to return a deck that contains so many errors that it is not worth processing. In such cases, it is necessary to correct and resubmit the entire deck. The printout will say "DATA ARE BEING CHECKED ONLY."

If the number of rejected cards is small, the card deck is resubmitted to the well-data-base input program to recheck the data and enter them into disk files for processing by other programs. During this time, the current date (yyyymmdd), time (hhmmss), card number in the deck (nnnnn), and deck-name identification (dddd) are appended to the end of each card. It is necessary to correct and resubmit only the cards that generated errors after the data have been entered (not just checked) through the input program. (The printout will not say "DATA ARE BEING CHECKED ONLY.") Rejected cards may be corrected and submitted later or may be corrected on the spot and resubmitted.

The deck-name identification is an arbitrary but unique one- to four-character identifier assigned to each deck of cards by the computer staff. The date, time, and card number are used by the subfile merge (updating) programs to guarantee that when several updates are submitted for the same field, they will be processed in the order submitted. The date, time, card number, and deck name are printed to the right of the card when an error is detected during the checking/updating process. On the report, this information is preceded by the abbreviation "SO," which stands for "submitted on." The card-number and deck-name identification allow errors to be quickly traced back to the original deck and to the card in that deck, if desired.

Well-Header File Update

The computer section now determines whether any of the cards submitted pertain to the well-header file. If so, the header file update program WHDUPD is run. This program is both a check and updating program that produces an update report titled "PROGRAM WHDUPD WELL-HEADER FILE UPDATE REPORT FOR (date)." In addition to the report, rejected cards are also written into an operator-specified reject file that the operator will print at the end of the update. Sometimes this file can aid the user in correcting errors, since all of the rejected cards are listed together. Remember that a well must be entered into the well-header file before it can be entered into a subfile, and that the well must be entered into the desired subfile before subfile data about the well can be stored.

Subfile Input-Edit

The next step is the first of two needed to update a subfile (such as the water-level subfile). First the computer section must determine whether any cards were submitted for a subfile. Only one subfile is considered at a time. If cards were submitted, the appropriate subfile input/edit program (xxIE)[1] is run. This is a checking program that transfers valid data into another series of temporary disk files that will be used during a merge to update the subfile.

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[1] xx can equal WL, PU, HY, QW, LG, or SI.

This program produces a report titled "(subfile) INPUT/EDIT REPORT FOR COUNTY (c) ON (date)." Rejected data should be corrected and resubmitted as soon as possible before the next subfile merge. Following this procedure may reduce the number of rejects from the merge program and decrease the number of merges that will need to be run.

Subfile Merge

The final step in updating a subfile is to run the appropriate subfile merge program (xxMERGE)[1]. No additions, modifications, or deletions are available for retrieval from the subfile until after the merge program has been run. The merge program will not necessarily be run every time data are submitted because it is time consuming. It will be run whenever a reasonable amount of data can be merged into a subfile, when requested by the coordinator in charge of the subfile, or as scheduled. A subfile merge program produces a report titled "(subfile) MERGE REPORT FOR COUNTY (c) ON (date)."

Program Messages

It is important to review the reports produced by the well-data-base programs because they indicate what the programs did and did not do with the data, and the reason. A "fatal" error, which is preceded by F:, can be eliminated only by correcting the error and submitting or resubmitting the necessary information. A fatal error indicates that the data were rejected by the well data base.

A message preceded by P: is a processing message that tells what the program did during the updating process.

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[1] xx can equal WL, PU, HY, QW, LG, or SI.

SECTION 3

CODING INSTRUCTIONS FOR ENTERING, UPDATING, AND DELETING WELL INFORMATION IN THE WELL-HEADER FILE

by

George W. Hawkins

CONTENTS

ILLUSTRATIONS

TABLES

INTRODUCTION

This section describes the coding procedures necessary for entering, updating, and deleting information in the well-header file, the disk-resident part of the well data base. The well-header file is the nucleus of all data retrievals. Data maintained in the file were chosen to prevent duplication of common information and to allow versatility of retrieval. The data are accessible both directly and from six subfiles stored on Linctape or 9-track tape. Common information about each well in the well-header file forms a basic site description, whereas detailed information about each well may be stored in the subfiles through other programs designed for this purpose. In addition, these other programs maintain pointers in the well-header file that indicate if and where additional data for a given well can be found. *Each well must be represented in the well-header file before data about that well can be stored in any of the subfiles.*

TERMINOLOGY AND EXPLANATIONS

Well-header file Record.--the information stored in the well-header file for one well.

Status Flag.--a flag in each well's record to indicate whether the data for the well have been checked.

The coding form in figure 3-1 depicts all card formats, card types, transaction codes, and data fields for the well-header file. The L.W.S. number of the well to be updated must always be coded in columns 1-10. One restriction imposed on the L.W.S. numbers in the well-header file is that for any given local well number, the first L.W.S. number entered into the file must end with a suffix number of 01; that is, L.W.S. numbers must be of the form Xnnnnnn 01.

CARD TYPES

The four types of cards that may be input to the well-header file for processing are described in table 3-1. These are referred to as F, J, T, and C and derive these designations from the card type punched in column 80. The card type must always be punched in column 80, and the transaction code must always be punched in column 79 on cards that will be used to update the well-header file. Examples of these cards are shown in figure 3-2.

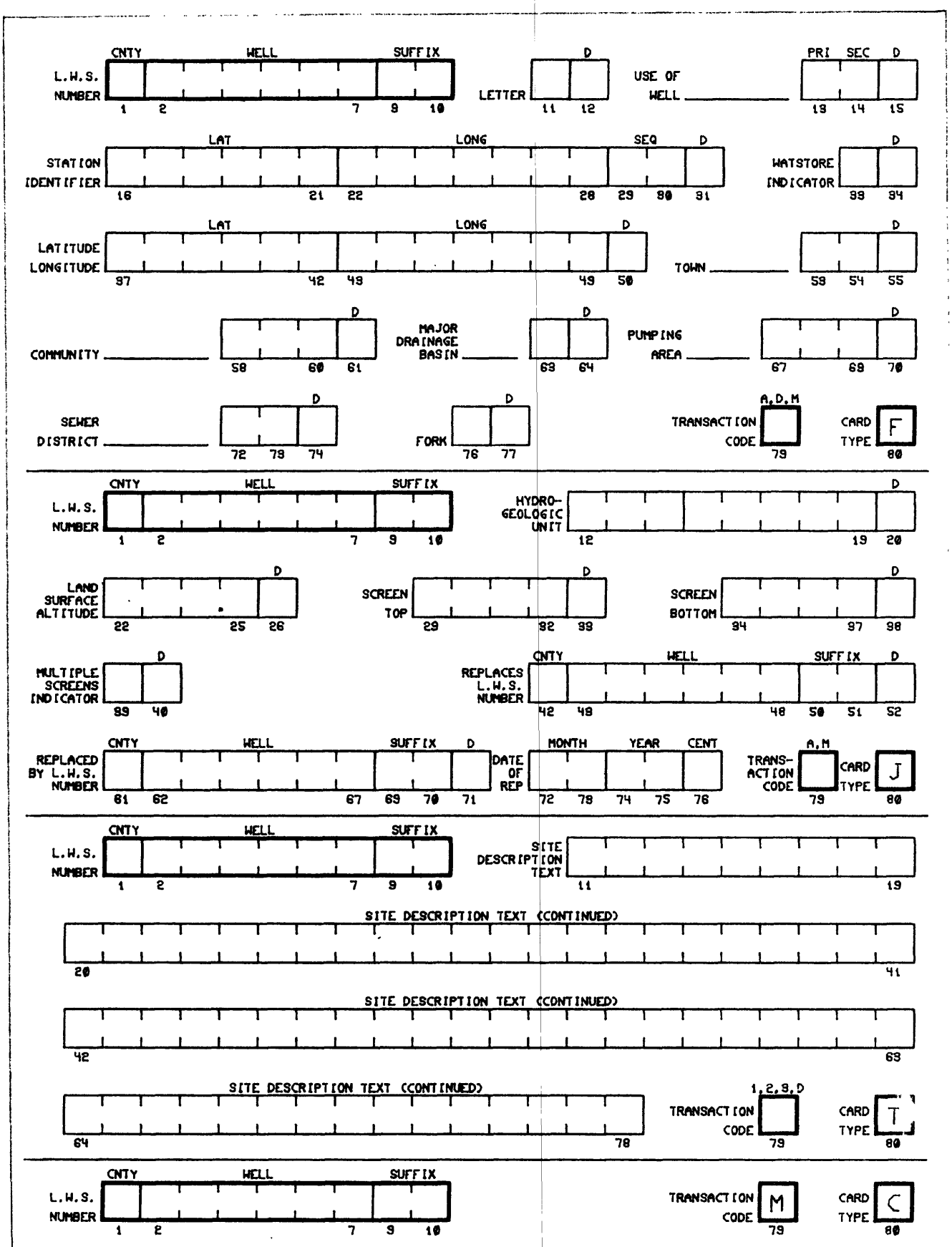


Figure 3-1.--Coding form for well-header file cards.

Table 3-1.--Information on cards for input to well-header file.

Card type	Content	
F	a) L.W.S. number	h) Community
	b) Official well-suffix letter	i) Major drainage basin
	c) Use of well	j) Pumping area
	d) Station identifier	k) Sewer district
	e) Data available in WATSTORE indicator	l) North or South Fork indicator (Suffolk County wells only)
	f) Latitude-longitude	m) Transaction code
	g) Town	n) Card type
J	a) L.W.S. number	f) Multiple screens indicator
	b) Hydrogeologic unit	g) Well that this well replaces (previous well)
	c) Land-surface altitude (feet above NGVD)	h) Well that replaces this well (replacement well)
	d) Top of screened interval(s) (depth in feet)	i) Replacement date
	e) Bottom of screened interval(s) (depth in feet)	j) Transaction code
		k) Card type
T	a) L.W.S. number	c) Text line number
	b) One line of site-description text	d) Card type
C	a) L.W.S. number	
	b) Transaction code	
	c) Card type	

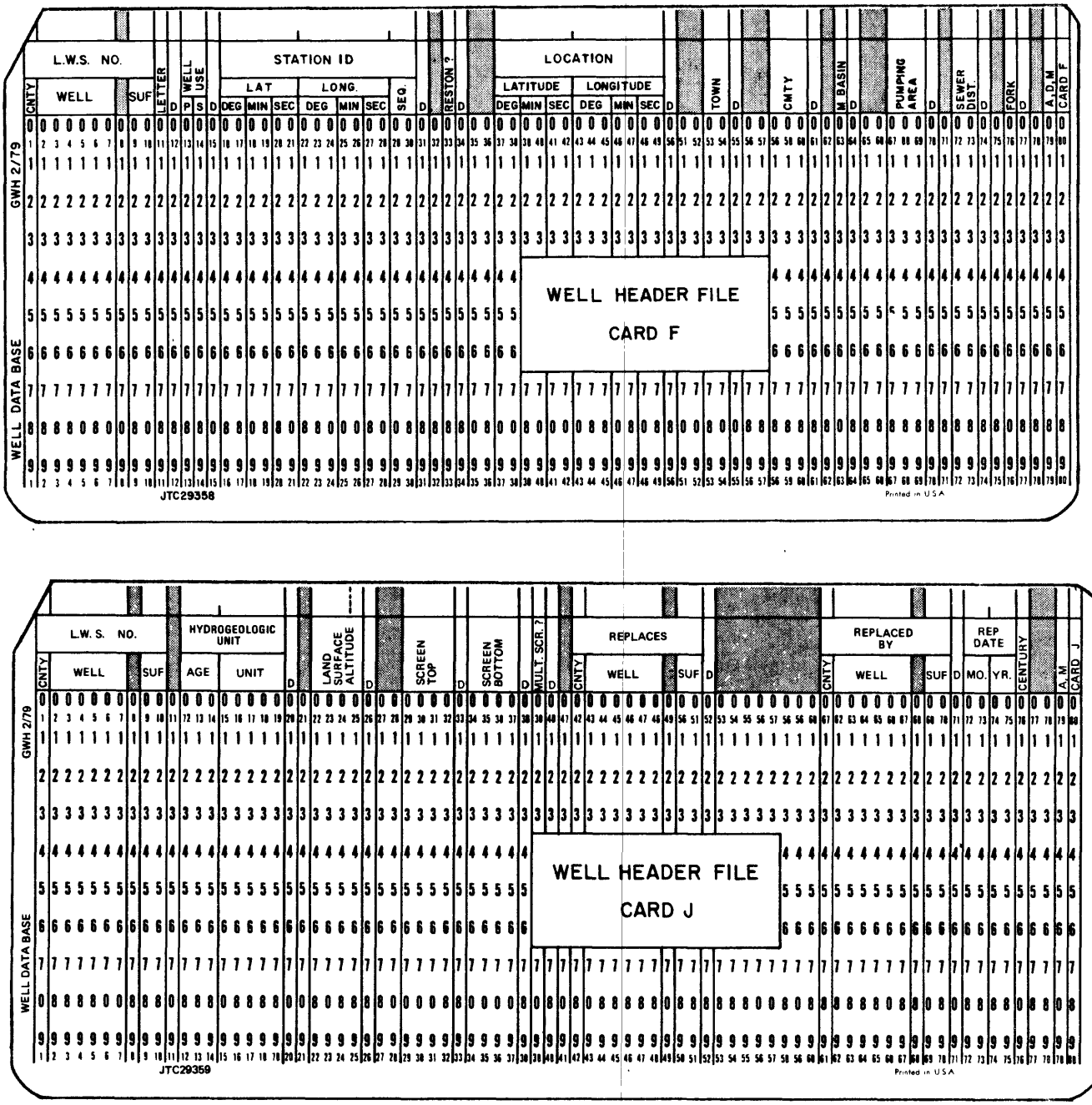
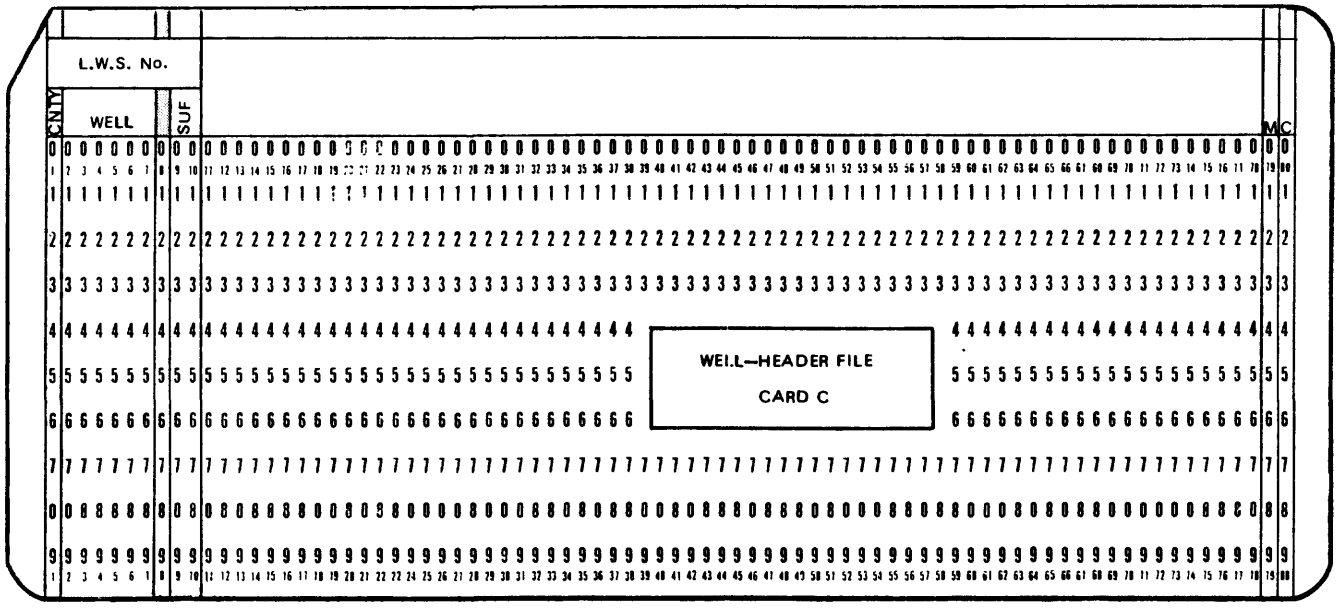


Figure 3-2.--Example of well-header file cards F and J.



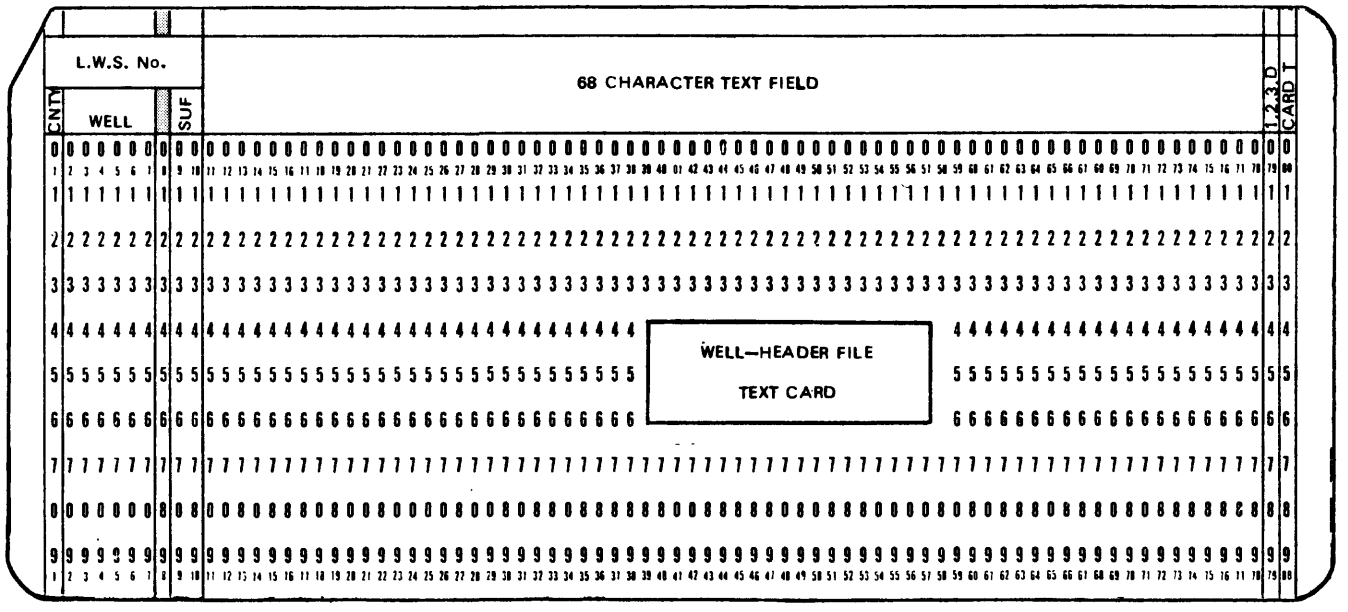


Figure 3-2.--Example of well-header file cards T and C.

TRANSACTION CODES

The six transaction codes that may be input to the well-header file for processing are described in the upper part of table 3-2. Not all combinations of card types and transaction codes are valid; the valid combinations are listed in the lower part of the table. It is often convenient to name a card according to the valid combinations. This convention is used in the following sections whenever convenient.

Table 3-2.--Transaction codes and valid combinations for input to well-header file.

Transaction Code	Meaning
A	Add a well.
M	Modify one or more data fields in a well.
D	Delete a well, or one or more data fields in a well.
1, 2, 3	Special pseudo-transaction codes used only on text cards to identify text line number. Each implies an M transaction.

Valid Combinations in Columns 79-80	Purpose
AF & AJ	Add a new well to the file (both cards required).
MF	Modify data for a well already in the file.
MJ	Modify data for a well already in the file.
DF	Delete a well from the file.
MC	Set the status flag of a well to "checked."
1T, 2T, or 3T	Replace a line of site-description text with a new line of text.
DT	Delete all three lines of site-description text.

FILE ORGANIZATION

The well-header file records are stored by county or section of a county in ascending order by local well number. When two or more wells have the same local well number (but a different suffix number), they are stored in ascending chronologic order according to the well-replacement data. *The suffix number of the L.W.S. number is not used in any way to determine the order of storage.* New wells are entered in the proper place in the file by shifting up all wells necessary to create an opening in the file at the appropriate record. A well is deleted by the reverse procedure.

CARD PROCESSING

Program WHDUPD (for updating the well-header file) processes each card in the input deck in the order in which it appears, except that when a new well is to be added to the well-header file, both a type AF and a type AJ card for that well must appear sequentially. Although the program is capable of processing any card for any county in any order, the well header file can hold no more than 3,000 wells on one disk. A large county's file may require more than one disk. Therefore each county or section of a county is updated separately, and data should be submitted by county or section of a county.

ADDING A NEW WELL

Adding a new well to the well-header file requires an F and a J card, both having transaction code A. Either card may be entered first, but both cards for the same well must appear together. Instructions for coding these cards are given in tables 3-3 and 3-4. Whenever the program encounters both cards and detects no fatal errors, it will do the following:

1. Enter the new well into the file,
2. Set all three text lines to blanks,
3. Set the current date into the "date last modified" field,
4. Set the status flag to "unchecked."

In addition to coding errors, the following conditions will generate a fatal error:

1. Attempting to add a well with an L.W.S. number whose suffix number is greater than 1 when no L.W.S. number with a suffix number of 1 is in the file.

2. Attempting to replace a well that is not in the file.

3. Attempting to add a well that has been replaced, when the replacement well is not in the file.

4. Attempting to add a well that is already in the file.

5. Coding the well-replacement date when both columns 42-51 (previous well) and 61-70 (replacement well) are blank.

6. Attempting to replace a well that already has a replacement well.

7. Attempting to add a well that has been replaced when the replacement well already replaces another well.

8. Coding both the previous and replacement well (only one can be coded).

When a previous or replacement well is coded, the update program enters the L.W.S. number from columns 1-10 into the appropriate opposite field in the record of the previous or replacement well. Thus, only one well has to be updated by the user[1]. Thus, if one links a well to a previous or replacement well, the update program will create a link in the opposite direction from the previous or replacement well to the well that is being added.

There is an occasional special use for the previous and replacement well fields. In the following example, assume that the file contains a series of wells whose L.W.S. numbers are all formed from the same local well number and that one more well having the same local well number is to be added.

If no previous or replacement-well information is coded on the J card when the new well is added, the update program for the well-header file assumes that the new well is chronologically the most recent and will add the new well to the end of the list of wells having the same local well number. If the file is up to date, replacement wells are more recent anyway. If the file is not up to date, the well to be added is not necessarily the most recent; for example, it may belong between two other wells or before the first well.

To cause the program to place a new well's record in a particular position in the file, the previous or replacement well field and date must be coded. The program will then use this information to place the added well after (if the previous well is coded), or before (if the replacement well is coded), the desired well. If the coded fields would have been coded anyway, this is no different from normal. If these fields were coded only to cause the well to be entered in the desired position, an MJ card should also be coded to remove the unwanted well-replacement data after the well is forced into the desired position in the file. This is done by using one of the deletion fields described in table 3-7, "Instructions for coding the MJ card."

It may be necessary to remove well-replacement data (if they exist) before adding the new well; it may also be necessary to add more well-replacement data after adding the new well, if the new well is to be linked to both a previous and replacement well, because only one of these fields can be coded on one card.

Perhaps it should be restated that the suffix of the L.W.S. number is used only to make the local well number unique; it does not determine the order of storage in the file. For convenience, some people purposely assign the oldest well the lowest suffix number (01).

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[1]Automatic linking is not possible in multi-disk counties unless both wells are on the same disk.

Table 3-3.--Instructions for coding the AF card.

Column	Contents/instructions
1-10	L.W.S. number.--Code the L.W.S. number of the well to be added. This field must be coded.
11	Official well-suffix letter, if applicable.--Code T, D, A, B, or C that may follow the local well number.
12	Blank.
13	Primary use of well.--Code as shown below: 1. Observation 2. Recharge 3. Test 4. Unused 5. Withdrawal 6. Destroyed
14	Secondary use of well.--Code as shown above.
15	Blank.
16-30	Station identifier.--Code station identifier from station header file in Geological Survey headquarters at Reston, Va. (WATSTORE) if one has been assigned.
31-32	Blank.
33	Data available in WATSTORE indicator.--Code a 1 if data for the well are stored in WATSTORE under the station identifier coded in columns 16-30; otherwise code numeric 0 or leave blank.
34-36	Blank.
37-49	Latitude-longitude.--Code location of well to nearest second. Note that N for north latitude is omitted.
50-52	Blank.
53-54	*Town (right justified).--Code as shown below: 1. Hempstead 2. North Hempstead 3. Oyster Bay 4. Babylon 5. Brookhaven 6. East Hampton 7. Huntington 8. Islip 9. Riverhead 10. Shelter Island 11. Smithtown 12. Southampton 13. Southold

*This information is most readily obtained by plotting the well on a map on which the area's boundaries are drawn.

Table 3-3.--Instructions for coding the AF card.--continued

Column	Contents/instructions
55-57	Blank.
58-60	*Community (right justified).--Select community from list of community codes in table 3-11, on page 3-27.
61-62	Blank.
63	*Major drainage basin.--Refers to hydrologic subbasin in which well is located. Code as shown below: 1. North of major ground-water divide 2. South of major ground-water divide 3. Peconic Bay drainage 4. South Fork drainage 5. North Fork drainage 6. Divide zone 9. Other
64-66	Blank.
67-69	*Pumping area (right justified).
70-71	Blank.
72-73	*Sewer District (right justified).
74-75	Blank.
76	*North or South Fork indicator (Suffolk County wells only).--Code N or S if well is located on North or South Fork. South Fork is any point east of the Shinnecock Canal; North Fork is any point east of Mattituck Creek. Do not confuse physical location of well on a Fork with major drainage basin or town.
77-78	Blank.
79-80	Always AF. This field must be coded.

*This information is most readily obtained by plotting the well on a map on which the area's boundaries are drawn.

Table 3-4.--Instructions for coding the AJ card.

Column	Contents/instructions
1-10	L.W.S. number.--Code L.W.S. number of well to be added. This field must be coded.
11	Blank.
12-19	Hydrogeologic unit (left justified).--Choose the code from table 3-5 (page 3-15) that best describes the hydrogeologic unit developed. Code 999MMMMM if multiple units are developed.
20-21	Blank.
22-25	Land-surface altitude (right justified).--Code altitude to nearest tenth of a foot, in feet above NGVD. The program assumes one decimal place; for example, 196 would be interpreted as +19.6 ft. Code .001 if altitude is true zero. Leave blank or code 0 if unknown.
26-28	Blank.
29-32	Top of screened interval(s) (right justified).--Code depth to top of uppermost screened interval(s), in feet below land surface, to nearest foot.
33	Blank.
34-37	Bottom of screened interval(s) (right justified).--Code depth to bottom of deepest screened interval(s), in feet below land surface, to nearest foot.
38	Blank.
39	Multiple screens indicator.--Code 1 if there is more than one screened interval, code 0 or leave blank if only one screened interval.
40-41	Blank.
42-51	Previous well.--Code L.W.S. number of the well that this well replaces. Coding of this 10-column field is similar to that for columns 1-10. The date on which the well coded in columns 42-51 was replaced must be coded in columns 72-76, and columns 61-70 must be left blank.
52-60	Blank.

Table 3-4.--Instructions for coding the AJ card.--continued

Column	Contents/instructions
61-70	Replacement well.--Code L.W.S. number of the well that replaces this well, or code -1 in columns 66-67 to indicate that the well was destroyed and has not been replaced. Coding of this 10-column field is similar to that for columns 1-10. The date on which the current well was replaced (or destroyed) must be coded in columns 72-76, and columns 42-51 must be left blank.
71	Blank.
72-73	*Month of well replacement (or destruction) (right justified).--Code numeric month of date on which well was replaced.
74-75	*Year of well replacement (or destruction) (right justified).--Code last two digits of year in which well was replaced.
76	Century-adjust (for year of replacement).--Leave blank for 1900, code - for 1800 or + for 2000.
77-78	Blank.
79-80	Always AJ. This field must be coded.

*Date is always the date on which a well was replaced (or destroyed). It may be either the date on which the current well was replaced by the replacement well, or the date on which the previous well was replaced by the current well, depending upon which field was coded. If the month is not known, code only the year. If the month and year are both unknown, code 13 for the month and leave the year blank.

Table 3-5.--Long Island Hydrogeologic Unit Codes.

Unit	Computer Code
Pleistocene	
Upper Glacial Aquifer	112GLCLU
Gardiners Clay	112GRDR
Jameco Aquifer	112JMCO
Port Washington Confining Unit	112PGFG
Port Washington Aquifer	112PGQF
Smithtown Clay	112SMTN
20-Foot Clay	11220CL
Upper Cretaceous	
Lloyd Aquifer	211LLYD
Magothy Aquifer	211MGTY
Monmouth Greensand	211MMGD
Raritan Confining Unit	211RCNF
Precambrian	
Basement Complex	400BCPX
If more than one unit, use	999MMMMM

MODIFYING WELL DATA

Data in the well-header file may occasionally require updating. Each of the nontransparent data fields may be updated. The card types that may be submitted for an update are F and J, and the transaction code specified must be M. When one or more fields in a well are to be updated, a field with no value may be entered, or a field with a value may be changed or deleted. All changes are handled similarly through the M transaction. Do not confuse the addition or deletion of a field (transaction M) with the addition or deletion of an entire well (transaction A or D).

Modification of a field is relatively easy. A properly coded field replaces the current contents of that field in the specified well; an improperly coded field or a blank field will have no effect on the current contents of the field in the specified well. In other words, code the field that is to be changed.

The above procedure contains one problem. Suppose well N000012 01 in the well-header file is designated as having the hydrogeologic unit 211MGTY (Magothy aquifer), but this designation is incorrect and the correct unit is unknown. The best solution would be to delete the unit 211MGTY. However, if, during an update, a blank field is ignored and the correct unit is unknown, how does one delete 211MGTY? A similar problem arises when attempting to set a numeric field to zero, since, in FORTRAN, both a field filled with blanks and a field filled with zeros will be interpreted as the number zero.

Each data field except the "replacement date" field is suffixed by a one-character code called a "deletion box." Whenever the transaction code is M, coding a D in the deletion box for a given field will delete the associated field in the specified well. The contents of the field to be deleted should be left blank on the card because the D overrides whatever may be coded in the field. If a character other than a D is coded in a deletion box, the character will be ignored, and normal updating will be attempted.

To conclude the example, the hydrogeologic unit of well N000012 01 may be deleted by coding a D in the deletion box for the hydrogeologic unit (column 20) on a J card (the card containing the hydrogeologic unit) with a transaction code of M. All other fields are handled in a similar manner. The card layouts for the data fields of an MF or MJ card are the same as defined in the preceding section, "Adding a New Well," except that deletion boxes have been added after each field.

To avoid duplicating the coding instructions for MF and MJ cards, only the card layout is given in tables 3-6 and 3-7. The fields should be coded as explained in the preceding section.

When a properly coded MF or MJ card is read, the program will:

1. Locate the desired well,

2. For each coded field, print the current value of the field, replace the current value with the new value, and print the new value,

3. Set the "date last modified" field to the current date,

4. Set the status flag to "unchecked."

Note that when modifying the previous or replacement well field, the update program does not remove any links to a replacement or previous well if one is already present. To modify (specifically, change) previous or replacement well data, the existing information must first be removed by submitting another card with a D in the deletion box for the appropriate field.

When a previous or replacement well is coded, the update program enters the L.W.S. number that is in columns 1-10 into the appropriate opposite field in the record of the previous or replacement well. Thus, only one well has to be updated by the user[1]. In other words, if one creates a link from a well to a previous or replacement well, the update program will create a link in the opposite direction from the previous or replacement well to the well that is being modified. Similarly, when a link to another well is deleted, the update program will remove the link from the other affected well in the opposite direction.

DELETING A WELL

A well may be deleted from the well-header file by submitting a DF card, which must contain the following information:

Column	Contents/instructions
1-10	L.W.S. number of the well to delete. This field must be coded.
11-78	Blank
79-80	Always DF. This field must be coded.

The well will not be deleted under any of the following conditions:

1. The well is not represented in the file,
2. If more than one well in the file has the same local well number and the well designated for deletion has an L.W.S. number with a suffix number of "01" (all other wells would have to be deleted first),
3. If any data for the well are stored in any of the six subfiles in the current level (that is, if the subfile pointers are in use). The well must first be deleted from the subfiles in which it is present.

If the well to be deleted contains a link to a previous or replacement well (or both), the link from the previous and replacement wells to the well being deleted will be removed by the update program[1]. Thus, no other wells will need to be updated by the user.

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[1]Automatic linking/unlinking is not possible in multi-disk counties unless both wells are on the same disk.

Table 3-6.--Instructions for coding MF card.

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11	Official well-suffix letter.
12	Deletion box for official well-suffix letter.
13-14	Use of well.--(user must always recode [replace] both the primary and secondary use when making an update).
13	Primary use of well.
14	Secondary use of well.
15	Deletion box for use of well (both).
16-30	Station identifier.
31	Deletion box for station identifier.
32	Blank.
33	Data available in WATSTORE indicator.
34	Deletion box for data available in WATSTORE indicator.
35-36	Blank.
37-49	Latitude-longitude.
50	Deletion box for latitude-longitude.
51-52	Blank.
53-54	Town (right justified).
55	Deletion box for town.
56-57	Blank.
58-60	Community (right justified).
61	Deletion box for community.
62	Blank.
63	Major drainage basin.
64	Deletion box for major drainage basin.

Table 3-6.--Instructions for coding MF card.--continued

Column	Contents/instructions
65-66	Blank.
67-69	Pumping area (right justified).
70	Deletion box for pumping area.
71	Blank.
72-73	Sewer district (right justified).
74	Deletion box for sewer district.
75	Blank.
76	North or South Fork indicator (Suffolk wells only).
77	Deletion box for fork indicator.
78	Blank.
79-80	Always MF. This field must be coded.

Table 3-7.--Instructions for coding the MJ Card.

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11	Blank.
12-19	Hydrogeologic unit (left justified).
20	Deletion box for hydrogeologic unit.
21	Blank.
22-25	Land-surface altitude (right justified).
26	Deletion box for land-surface altitude.

Table 3-7.--Instructions for coding the MJ Card.--continued

Column	Contents/instructions
27-28	Blank.
29-32	Top of screened interval(s) (right justified).
33	Deletion box for top of screened interval(s).
34-37	Bottom of screened interval(s) (right justified).
38	Deletion box for bottom of screened interval(s).
39	Multiple screens indicator.
40	Deletion box for multiple screens indicator.
41	Blank.
42-51	Previous well.--Code L.W.S. number of well that this well replaces. Coding is similar to that for columns 1-10. Date that well coded in columns 42-51 was replaced must be coded in columns 72-76, and columns 61-70 must be left blank.
52	Deletion box for previous well.
53-60	Blank.
61-70	Replacement well.--Code L.W.S. number of well that replaces this well, or code -1 in columns 66-67 to indicate that well was destroyed and has not been replaced. Coding is similar to that for columns 1-10. Date that this well was replaced (or destroyed) must be coded in columns 72-76, and columns 42-51 must be left blank.
71	Deletion box for replacement well.
72-73	Month of well replacement (or destruction).
74-75	Year of well replacement (or destruction). The date cannot be deleted, it can only be modified. Date is deleted when deleting the replacement well.
76	Century-adjust (for year of replacement or destruction).
77-78	Blank.
79-80	Always MJ. This field must be coded.

SITE-DESCRIPTION CARDS

Each well-header file record may contain a brief site description. The site-description field consists of three lines of 68 characters addressable by line number. This field is initially set to all blanks at the time a new well is entered into the file and may be updated any time thereafter. The site-description field should be used to briefly describe the location of the well and to provide other pertinent location or historic data about the well. The description entered should apply to the well regardless of the type and amount of data that may be stored in any of the six subfiles. Descriptions that are specific for only one type of well data should be entered in the historic text field for the specific subfile instead of the well-header file. All text lines should be left justified, and blank wasted space should be kept to a minimum. Line 1 should be coded first, line 2 second, etc.

When coding text cards for the well-header file, do not split words at the end of a line of text; start a new line instead. Each line is treated (printed) separately during output.

The regular transaction codes (except D) do not apply to text cards because it would be difficult to code the card if the user could add only a line that was currently blank or modify a line that was not blank, etc. Clearly this degree of protection is not required for text cards. Instead, the program assumes that the transaction code for all text cards is M (modify) and further assumes a special type of M transaction that is known as a replace transaction. Whenever a text card is encountered, the program will automatically replace a given line of text in the specified well in the well-header file with the line of text on the card submitted. The reader may ask "Which line?" Since the program is determining the transaction type, column 79 of the card is free. This column is used to specify the text-line number to be replaced in the text field. This number may be 1, 2, 3, or D. (D has a special meaning and is described further on).

Text cards with column 79 coded with 1, 2, or 3 are coded as follows:

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11-78	Up to 68 characters of site-description text.
79	Line number.--(1, 2, or 3). This field must be coded.
80	Always T. This field must be coded.

The action taken by the program upon encountering any one of the above is:

1. Locate the well and print the current contents of text line n where n is the number coded in column 79,
2. Replace the old line of text with the new line of text,
3. Print the new line of text,

4. Set the "date last modified" field to the current date,

5. Set the status flag to "unchecked."

To delete a given line of text in a well, the user need only submit a text card for the desired line with blanks in columns 11-78. However, it may occasionally be necessary to set all three lines of text in a given well to blanks. This could be done by submitting a new blank text line for each of the three lines, or using a transaction code of D in column 79. The card is coded as follows:

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11-78	Blank.
79-80	Always DT.--This field must be coded.

When this card is encountered, the action taken is:

1. Locate the desired well,

2. Print the content of all three lines of text,

3. Set all three lines of text to blanks and notify the user via printed message,

4. Set the "date last modified" field to the current date,

5. Set the status flag to "unchecked."

MODIFYING THE STATUS FLAG

When a new well is entered into the file, or when any modifications are applied to a well, the status flag is set to "unchecked," and the current date is stored in the "date last modified" field for the well. The last card to be described allows the status flag to be set to "checked." The status flag should be set to "checked" as soon after an update (or initial entry) as possible when the user believes that the data for a well in the well-header file are as complete and accurate as possible.

This card is coded as follows:

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11-78	Blank.
79-80	Always MC.--This field must be coded.

This is the only card that makes a modification to a well without setting the status flag to "unchecked" and without modifying the "date last modified" field. This insures that the date reflects the most recent update instead of the date that the well was checked. The status flag is the only transparent data field that may be directly modified by the user. The transparent and nontransparent data fields in the well-header file are listed in tables 3-8 and 3-9, respectively.

Table 3-8.--Transparent data fields in well-header file.

A. FIELDS IN EACH WELL-HEADER FILE RECORD

Record Number.

Status flag (checked/unchecked).

Date record was last modified.

12 contiguous spare words.

24 Subfile pointers (6 files x 2 levels x 2 pointers).

B. MISCELLANEOUS FIELDS ONLY IN RECORD ZERO FOR EACH COUNTY

Record number.

Number of records.

County.

Current level of each of the 6 subfiles.

12 starting Linctape file numbers (6 files x 2 levels).

12 highest tape written data fields (6 fields x 2 levels).

Highest number of records ever in the file.

6 subfile tape type indicators.

Table 3-9.--Nontransparent data fields in each record of well-header file.

L.W.S. number.	North or South Fork indicator (Suffolk wells only).
Official well-suffix letter.	Hydrogeologic unit.
Use of well (primary and secondary).	Land-surface altitude.
Station identifier.	Top of screened interval(s).
Data available in WATSTORE indicator.	Bottom of screened interval(s).
Latitude-longitude.	Multiple screens indicator.
Town.	Previous well (well that this well replaces).
Community.	Replacement well (well that replaces this well), and
Major drainage basin.	Replacement date.
Pumping area.	3 lines (68 characters/line) of site-description text.
Sewer district.	

PROGRAM MESSAGES

The well-header file update program will print a message on the line printer for every process in the program. The messages are of three types--fatal, nonfatal, and processing.

A fatal error message is issued whenever the program detects a serious error in any of the data fields on the card being processed. A fatal error detected in any data field during the addition of a new well will abort the addition of the well, and a fatal error detected in one of the data fields when a well is being updated causes the updating of the erroneous field to be aborted. All fatal error messages are preceded by F:.

A nonfatal error message is issued whenever the program detects a blank (missing) field or a nonfatal coding error (most of which are correctable by the program).

A processing message is issued whenever the program has completed some change to the file. All processing messages are preceded by P:.

The error checks performed on fields by the program are listed in table 3-10.

Table 3-10.--Error checks performed on fields.

Data Field Name	Checking Procedure
L.W.S. number	1st column must be K, N, P, Q, S, or W. Next six columns must be unambiguous: a. Only one period (if any). b. Right justification if no period appears. c. If a period appears, only blanks or zeros may follow it. d. Characters must be numeric, blank, or period. e. Number must be within the current acceptable range for the specified county. 8th column must be blank. Last two columns (suffix no.) must be unambiguous: a. No periods. b. Characters must be numeric or blank (one digit must be coded). c. Right justified.
Official well-suffix letter	Must be T, D, A, B, C, or blank.
Use of well	Must be one of the assigned codes.
Station identifier	All characters must be numeric: 1st character must be 4. 2nd character must be 0 or 1. 3rd character must be less than 6. 5th character must be less than 6. 7th and 8th characters must be 07. 9th character must be 1, 2, 3, or 4. 10th character must be less than 6. 12th character must be less than 6. 14th and 15th characters must be less than 64.
Data available in WATSTORE indicator	Must be 0, blank, or 1. Cannot be 1 if no station identifier was entered.
Latitude-longitude	Degrees latitude must be 40 or 41. Degrees longitude must be 071 to 074. No minutes or seconds may exceed 59. Latitude must be between 403300 and 411800, inclusively. Longitude must be between 715100 and 740300, inclusively.

Table 3-10.--Error checks performed on fields.--continued

Data Field Name	Checking Procedure
Town	Must be in county specified in column 1.
Community	Must be in town coded unless no town was coded. Then it is unchecked.
Major drainage basin	Must be one of the assigned codes.
Pumping area	Unchecked.
Sewer district	Unchecked.
North or South Fork indicator	Must not be coded unless county is Suffolk. If county is Suffolk, must be blank, N, or S.
Hydrogeologic unit	Must begin with 3 numeric digits and end with 4 or 5 alpha characters and be left justified.
Land-surface altitude	Must be between 0 and 400 feet, inclusively.
Top of screened interval(s) and bottom of screened interval(s)	Must be between 0 and 2,000 feet, inclusively. Bottom must be larger than top.
Multiple screens indicator	Must be blank, zero, or 1. Cannot be 1 if no screened intervals were coded.
Previous well	Same as L.W.S. number. Replacement date must be coded, replacement well must not be coded. Previous local well number must not exceed local well number in columns 2-7, and county must be the same.
Replacement well	Same as L.W.S. number. Replacement date must be coded, previous well must not be coded. Replacement local well number must not be less than local well number in columns 2-7, and county must be the same.
Replacement date	Must be valid date not exceeding current date. Cannot be coded (except on MJ card) unless either previous or replacement well is coded.

Table 3-11.--Long Island community codes.

Community Name[1]	Number	County[2]	Town
Albertson	50	N	2
Amagansett	317	S	6
Amityville (Inc.)	156	S	4
Aquebogue	262	S	9
Asharoken (Inc.)	129	S	7
Atlantic Beach (Inc.)	1	N	1
Babylon (Inc.)	157	S	4
Baiting Hollow	263	S	9
Baldwin	2	N	1
Baxter Estates (Inc.)	51	N	2
Bay Park	3	N	1
Bay Shore	187	S	8
Bayport	186	S	8
Bayview	274	S	13
Bayville (Inc.)	91	N	3
Belle Terre (Inc.)	212	S	5
Bellerose (Inc.)	4	N	1
Bellerose Terrace	5	N	1
Bellmore	6	N	1
Bellport (Inc.)	213	S	5
Bethpage	92	N	3
Blue Point	214	S	5
Bohemia	188	S	8
Branch	168	S	11
Brentwood	189	S	8
Bridgehampton	290	S	12
Brightwaters (Inc.)	190	S	8
Brookhaven	215	S	5
Brookville (Inc.)	93	N	3
Calverton	264	S	9
Carle Place	52	N	2
Cedarhurst (Inc.)	7	N	1
Center Island (Inc.)	94	N	3
Center Moriches	217	S	5
Centereach	216	S	5
Centerport	130	S	7
Central Islip	191	S	8
Central Islip State Hospital	192	S	8
Cold Spring Harbor	131	S	7
Commack*	169	S	7 or 11
Copiague	158	S	4
Coram	218	S	5
Cove Neck (Inc.)	95	N	3
Cutchogue	275	S	13
Deer Park	159	S	4
Dering Harbor (Inc.)	330	S	10
Dix Hills	133	S	7
Dororis Pond	96	N	3
East Greenlawn	134	S	7
East Hampton (Inc.)	318	S	6
East Hills (Inc.)	53	N	2
East Huntington	135	S	7
East Islip	193	S	8
East Jamesport	265	S	9
East Marion	276	S	13
East Massapequa	97	N	3
East Meadow	8	N	1
East Moriches	220	S	5
East Neck	136	S	7
East Northport	137	S	7
East Norwich	98	N	3
East Patchogue	221	S	5
East Port Jefferson	222	S	5
East Quogue	291	S	12
East Riverhead	266	S	9
East Rockaway (Inc.)	9	N	1
East Setauket	223	S	5
East Williston (Inc.)	54	N	2
Eastport	219	S	5
Eatons Neck	138	S	7
Edgewood	194	S	8
Edgewood Hospital	160	S	4
Elmont	10	N	1
Elwood	139	S	7
Farmingdale (Inc.)	99	N	3
Farmingville	224	S	5
Fishers Island	277	S	13
Flanders	292	S	12
Floral Park (Inc.)*	55	N	1 or 2
Flower Hill (Inc.)	56	N	2
Flowerfield	170	S	11
Fort Salonga	171	S	11
Franklin Square	12	N	1
Freeport (Inc.)	13	N	1
Freetown	319	S	6
Garden City (Inc.)	14	N	1
Garden City Park	57	N	2
Garden City South	15	N	1
Gardiners Island	320	S	6
Glen Cove (Inc.)	100	N	3
Glen Head	101	N	3
Glenwood Landing	102	N	3
Great Neck	140	S	7
Great Neck (Inc.)	58	N	2
Great Neck Estates (Inc.)	59	N	2
Great Neck Plaza (Inc.)	60	N	2
Great River	195	S	8
Greenlawn	141	S	7
Greenport	278	S	13
Greenport (Inc.)	279	S	13
Greenvale*	103	N	2 or 3
Halesite	142	S	7
Half Hollow Hills	143	S	7
Hampton Bays	293	S	12
Hauppauge*	196	S	8 or 11
Head of the Harbor (Inc.)	173	S	11

[1] *Communities that overlap town boundaries
Inc. = incorporated

[2] N = Nassau; S = Suffolk

Table 3-11.--Long Island community codes.--continued

Community Name[1]	Number	County[2]	Town
Hempstead (Inc.)	16	N	1
Herricks	62	N	2
Hewlett	17	N	1
Hewlett Bay Park (Inc.)	18	N	1
Hewlett Harbor (Inc.)	19	N	1
Hewlett Neck (Inc.)	20	N	1
Hicksville	104	N	3
Hither Hills	321	S	6
Holbrook*	225	S	5 or 8
Holtsville	226	S	5
Huntington	144	S	7
Huntington Bay (Inc.)	145	S	7
Huntington Station	146	S	7
Inwood	21	N	1
Island Park (Inc.)	22	N	1
Islip	198	S	8
Islip Terrace	199	S	8
Jamesport	267	S	9
Jericho	105	N	3
Kensington (Inc.)	63	N	2
Kings Park	174	S	11
Kings Park State Hospital	175	S	11
Kings Point (Inc.)	64	N	2
Lake Grove	227	S	5
Lake Grove (Inc.)	228	S	5
Lake Ronkonkoma*	229	S	5, 8 or 11
Lake Success (Inc.)	65	N	2
Lakeland	200	S	8
Lakeview	23	N	1
Lattington (Inc.)	106	N	3
Laurel	280	S	13
Laurel Hollow (Inc.)	107	N	3
Lawrence (Inc.)	24	N	1
Levittown	25	N	1
Lido-Point Lookout	26	N	1
Lindenhurst (Inc.)	161	S	4
Lloyd Harbor (Inc.)	147	S	7
Locust Grove	108	N	3
Locust Valley	109	N	3
Long Beach (Inc.)	28	N	1
Lynbrook (Inc.)	27	N	1
Malverne (Inc.)	29	N	1
Manhasset	66	N	2
Manor Haven (Inc.)	67	N	2
Massapequa	110	N	3
Massapequa Park (Inc.)	111	N	3
Mastic	230	S	5
Mastic Beach	231	S	5
Matinecock (Inc.)	112	N	3
Mattituck	281	S	13
Maywood	162	S	4
Mecox	294	S	12
Medford	232	S	5
Melville	148	S	7
Merrick	30	N	1
Middle Island	233	S	5
Mill Neck (Inc.)	113	N	3
Mill Neck Creek	114	N	3
Miller Place	234	S	5
Mineola (Inc.)	68	N	2
Montauk	322	S	6
Montauk Point	323	S	6
Mount Sinai	235	S	5
Munsey Park (Inc.)	69	N	2
Muttontown (Inc.)	115	N	3
Napeague	324	S	6
Nassau Point	282	S	13
Nesconset	177	S	11
New Cassel	70	N	2
New Hyde Park (Inc.)*	71	N	1 or 2
New Suffolk	283	S	13
Nissequogue (Inc.)	178	S	11
North Amityville	163	S	4
North Babylon	164	S	4
North Bay Shore	202	S	8
North Bellmore	32	N	1
North Bellport	236	S	5
North Bridgehampton	295	S	12
North Brookhaven	237	S	5
North Coram	238	S	5
North Great River	203	S	8
North Haven (Inc.)	296	S	12
North Hills (Inc.)	72	N	2
North Islip	204	S	8
North Lindenhurst	165	S	4
North Mastic	239	S	5
North Mattituck	284	S	13
North Merrick	33	N	1
North Middle Island	240	S	5
North Moriches	241	S	5
North New Hyde Park	73	N	2
North Patchogue	242	S	5
North Quogue	297	S	12
North Ridge	243	S	5
North Sea	298	S	12
North Selden	244	S	5
North Smithtown	179	S	11
North Southold	285	S	13
North Valley Stream	34	N	1
Northport (Inc.)	149	S	7
Northport Veterans Hospital	150	S	7
Northville	268	S	9
Noyack	299	S	12
Oakdale	205	S	8
Oceanside	35	N	1
Old Bethpage	116	N	3
Old Brookville (Inc.)	117	N	3
Old Field (Inc.)	245	S	5
Old Westbury (Inc.)*	118	N	2 or 3
Orient Point	286	S	13
Oyster Bay	119	N	3
Oyster Bay Cove (Inc.)	120	N	3
Patchogue (Inc.)	246	S	5
Peconic	287	S	13

[1]*Communities that overlap town boundaries
Inc. = incorporated

[2] N = Nassau; S = Suffolk

Table 3-11.--Long Island community codes.--continued

Community Name[1]	Number	County[2]	Town
Pilgrim State Hospital	206	S	8
Plainedge	121	N	3
Plainview	122	N	3
Plandome (Inc.)	75	N	2
Plandome Heights (Inc.)	76	N	2
Plandome Manor (Inc.)	77	N	2
Plum Island	288	S	13
Poquott (Inc.)	247	S	5
Port Jefferson (Inc.)	248	S	5
Port Jefferson Station	249	S	5
Port Washington	78	N	2
Port Washington North (Inc.)	79	N	2
Quogue	300	S	12
Quogue (Inc.)	301	S	12
Remsenburg	302	S	12
Ridge	250	S	5
Riverhead	269	S	9
Roanoke	270	S	9
Rockville Centre (Inc.)	36	N	1
Rocky Point	251	S	5
Ronkonkoma	252	S	5
Roosevelt	37	N	1
Rose Grove	303	S	12
Roslyn (Inc.)	80	N	2
Roslyn Estates (Inc.)	81	N	2
Roslyn Harbor (Inc.)*	123	N	2 or 3
Roslyn Heights	83	N	2
Russell Gardens (Inc.)	84	N	2
Saddle Rock (Inc.)	85	N	2
Sag Harbor	325	S	6
Sag Harbor (Inc.)*	326	S	6 or 12
Sagaponack	304	S	12
Saint James	180	S	11
San Remo	181	S	11
Sands Point (Inc.)	86	N	2
Sayville	207	S	8
Sea Cliff (Inc.)	124	N	3
Seaford	38	N	1
Searingtown	87	N	2
Selden	253	S	5
Setauket	254	S	5
Shelter Island	331	S	10
Shinnecock Hills	306	S	12
Shirley	255	S	5
Shoreham (Inc.)	256	S	5
Smithtown	182	S	11
Smithtown Center	183	S	11
Sound Beach	257	S	5
South Bellport	258	S	5
South Farmingdale	125	N	3
South Floral Park (Inc.)	39	N	1
South Hempstead	40	N	1
South Huntington	151	S	7
South Islip	208	S	8
South Riverhead	308	S	12
South Setauket	259	S	5
South Smithtown	184	S	11
South Valley Stream	41	N	1
South Westbury	42	N	1
Southampton (Inc.)	307	S	12
Southold	289	S	13
Speonk	309	S	12
Springs	327	S	6
Squiretown	310	S	12
Steward Manor (Inc.)	43	N	1
Stony Brook	260	S	5
Syosset	126	N	3
Thomastown (Inc.)	88	N	2
Three Mile Harbor	328	S	6
Tiana	311	S	12
Tuckahoe	312	S	12
Uniondale	44	N	1
Upper Brookville (Inc.)	127	N	3
Valley Stream (Inc.)	45	N	1
Vernon Valley	152	S	7
Village of The Branch (Inc.)	185	S	11
Wading River	271	S	9
Wainscott	329	S	6
Wantagh	46	N	1
Water Mill	313	S	12
West Babylon	166	S	4
West Hempstead	47	N	1
West Hills	153	S	7
West Huntington	154	S	7
West Islip	209	S	8
West Jamesport	272	S	9
West Melville	155	S	7
West Ronkonkoma	210	S	8
West Sayville	211	S	8
West Tiana	316	S	12
Westbury (Inc.)	89	N	2
Westhampton	314	S	12
Westhampton Beach (Inc.)	315	S	12
Wildwood	273	S	9
Williston Park (Inc.)	90	N	2
Woodbury	128	N	3
Woodmere	48	N	1
Woodsburgh (Inc.)	49	N	1
Wyandanch	167	S	4
Yaphank	261	S	5

[1] *Communities that overlap town boundaries
Inc. = incorporated

[2] N = Nassau; S = Suffolk

SECTION 4

REAL-TIME DISPLAY PROGRAM FOR THE WELL-HEADER FILE

by

George W. Hawkins

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INTRODUCTION

The Real-Time Display Program for the well-header file (program WHDDSP) allows the user to retrieve well data from the well-header file and display it on the console screen; a hard-copy option is also available (table 4-1). This program is intended for use on a Data General 6012 display in page mode; the use of other consoles may require program changes because not all consoles respond in the same way to the control codes used. Well data may be retrieved directly by local well and suffix (L.W.S.) number, station identifier, or record number, and indirectly by a number of one-letter commands. This program is most useful for examining data for a few wells, particularly those that are new or that have been recently updated, which may not appear in the most recent printouts. In addition, a user-written option may be added to the program to accommodate simple one-time applications. (Implementation of this option is described in the documentation for program HDWRITER in section 6, "Instructions for implementing a user-written option in the Real-Time Display Program for the well-header file.")

Table 4-1.--Example of hard copy from display program.

RECORD# 1153 WELL N 1263. 2
REPLACES WELL N 1263. 1 REPLACED BY WELL N 1263. 3 ON 3/1948

USE	STATION IDENTIFIER	WATSTORE	TOWN	CMTY	SD	PUMPING AREA	LAST UPDATE
1	404302073295702	N	1	25	0	0	3/19/81

BASIN/F	LAT	LONG	UNIT	ALTITUDE	SCR TOP	SCR BOT	MULT SCR	CHECKED
0	404302.	732958.	112GLCLU	66.0	0	0	N	N

TEXT: OWNED BY N.C.D.P.W ON 12/48, N 1263 REPORTED DESTROYED. IN REALITY N 1263-1 WAS DESTROYED. A REPLACEMENT HAD BEEN DRILLED AND LATER REMOVED WHEN ERROR WAS DISCOVERED. MEASURMENT OF 1263-2 CONTINUED.

IRES= 0 RSPARE= 0.00000E 0 ISPARES= 0 0
0 0 0 0 0
0 0 0 0 0

SUBFILE DATA:	WL	PU	HY	QW	LG	S1
LEVEL A:	0 0, 0	0, 173	10402, 0	0, 0	0, 0	0,
LEVEL B:	0 0, 0	0, 171	11202, 0	0, 0	0, 0	0,

WELL-HEADER FILE COMMAND SUMMARY

The one-letter commands given in table 4-2 are available to retrieve well data from the well-header file. Some of the commands require additional information to be entered.

Whenever information for a well is directly or indirectly retrieved by L.W.S. number, the L.W.S. number of the well retrieved will blink on the screen[1]. Whenever the information is retrieved by the station identifier, the station identifier will blink. This indicates to the user which index table was required for the last retrieval and is thus currently in memory. A different index table is required for retrieval by L.W.S. number and for retrieval by station identifier for each county, and some time is required to switch from one table to another. Waiting time can be minimized by restricting retrievals to one method and one county. Note that retrieval by record number does not require or alter the status of either index table.

Table 4-2.--Well-header file command summary.

Command Letter	Purpose
K, N, P, Q, S, or W	To request retrieval of a well by L.W.S. number. Numeric part of local well number must immediately follow the county letter, and this must be followed by a comma and the suffix number. For example, to retrieve well N001256 01, enter N1256,1 followed by a carriage return. If zero is entered for the suffix number (example: N1256,0), the program will attempt to retrieve and display the current well. The current well is defined as the most recent well that has not been replaced or destroyed and is not a test hole, that matches the local well number. Note that one well must be retrieved by L.W.S. number before most of the other 1-letter commands may be issued, since they operate only on the currently open file. No file will be open until the first well is retrieved.
4	To request the retrieval of a well by its station identification number. After the "4" is typed, the rest of the 15-character station identifier must immediately follow. Remember that the command "4" is the beginning "4" of the station identifier and should not be entered twice. For example, enter "404040073261901" to retrieve the well having that identifier. A search for the desired well is made in the county currently open unless the station identifier is immediately followed by the county letter of the county to open and search. For example, if Nassau County is the county currently open, enter "4040400732619015" to search for the above well in Suffolk County.

[1]Assuming that the console is the 6012 display.

Table 4-2.--Well-header file command summary.--continued

Command Letter	Purpose
R	To retrieve a well by its record number in the file. Only the file currently open is used.
#	To obtain the current number of records and the highest number of records ever contained in the file currently open.
F	To retrieve the well that occupies the next highest record number in the file currently open (forward).
B	To retrieve the well that occupies the next lowest record number in the file currently open (backward).
A	To retrieve the well that replaces the well currently displayed.
D	To retrieve the well that the currently displayed well replaces.
C	To obtain a printed list of the L.W.S. numbers of all wells in the file currently open.
O	To save (write) the L.W.S. number of the currently displayed well in disk file DSPWEL.DD. This file may later be used as an input file to an applications program. If file DSPWEL.DD already exists the first time this command is issued, the user may either append or delete the file.
T	To obtain the current level of each of the six subfiles and to obtain the highest tape file written in each of the two levels in each of the six subfiles of the file currently open.
L	To obtain a printed copy of the well-header file information for the well currently displayed.
I	To read the next L.W.S. number from a user specified file and retrieve and display the information about that well. This command will ask for the input file if no input file is already open. File DSPWEL.DD cannot be used for the input file if it is already open for output ("O" command).
U	To execute the user's option. See the documentation for program HDWRITER for the procedure for adding a user-written option to the display program.
H	To terminate the program and return control to the command line interpreter (CLI) or calling program.

SECTION 5

PROGRAMMER'S REFERENCE MANUAL

FOR THE

WELL-HEADER FILE

By

George W. Hawkins

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ILLUSTRATIONS

TABLES

INTRODUCTION

This section describes the internal structure and programming methods used within the well-header file of the well data base and includes the names and functions of the various files, labeled COMMON blocks, and program variables. The purpose of this section is to provide a reference for FORTRAN programmers who wish to write and implement their own retrieval or application programs.

The reader is assumed to be familiar with the FORTRAN programming language, operating under Data General's Real Time Disk Operating System (RDOS), and to be familiar with all other pertinent sections herein that describe the programs and files of the well-header file.

WELL-DATA RETRIEVAL

The retrieval software for the well-header file is a modular set of nested subroutines. These subroutines communicate through multiple blocks of labeled COMMON. Although a few of the COMMON blocks are for internal program control purposes, most are used as buffers for well data. A small amount of data is usually passed through the arguments of each subroutine also.

By default, the well-header file software will grant only read access privileges to the file. Programmers requiring both read and write access privileges should discuss the application with the data-base manager to obtain the programming procedures required; this helps to prevent accidental destruction of the data.

Retrieval of well data is quite simple. After initialization, the programmer need call only one subroutine, passing as arguments the L.W.S. number desired. Another subroutine permits retrieval by station identifier. These subroutines will invoke other subroutines as required and will return a value that indicates whether data for the desired well was found. If so, the complete well-header file record will be available in one of the COMMON blocks. Before this procedure is presented, the file structure and a few subroutines, COMMON blocks, program variables, and constants, are described.

WELL-HEADER FILE STRUCTURES

Disk Files and Names

The well-header file consists of a series of disk-resident files and the software required to get access to them. Six disk files are required for each county or section of a county, and six "counties" are supported. (Two of these do not correspond to actual Long Island counties but are set aside for future expansion or special exceptions.) As many as 3,000 wells may be represented on one disk. A large county may require more than one disk or section. The six "counties" are listed below; the first letter of each county is used to reference it.

K, Kings	P, reserved	S, Suffolk
N, Nassau	Q, Queens	W, reserved

Each program that will have access to the well-header file must make one initialization call to subroutine HDNAM. This subroutine obtains the six base names for the well-header files out of disk file HDNAMES and opens FORTRAN channel 12 for appending to disk file $WHDPRT.

File $WHDPRT is normally linked to file $LPT (line printer) so that all output to channel 12 goes directly to the line printer. If the link to the line printer is changed or deleted, all output to channel 12 will go to the specified file instead. This is most useful for multiple copies of tables, or the storage of printer output on disk, etc.

Each base name must be 10 characters long with the first two characters set to blanks. Whenever a new county is opened, subroutine HEDOPN will fill in the blanks with the first letter of the desired county followed by an H. The programmer may easily get access to a separate set of header files by changing the base names. Since all programs that have access to the well-header file obtain base-file names in this manner, this provides a simple way to create a temporary header file for program testing without the possibility of destroying "live" data. The initial base name assignments and file purposes are described in order below. The fourth character of the file names is changed to 2, 3, 4, etc. for counties that require more than one disk.

Base Name[1]	Purpose
bbEDFIL.DD	Well-Header File data (randomly accessible).
bbEDKEY.DD	Index table by L.W.S. number for randomly accessing data in above file.
bbEDSTA.DD	Index table by station identifier for randomly accessing data in first file.
bbEDSID.DD	Index table containing two lists of record numbers, one sorted by station identifier, the other by latitude-longitude for accessing the data in the first file.
bbEDRES.DD	Reserved table.
bbEDLCK.DD	Locking file. The absence of this file for a county prevents access to the data for that county.

The generated disk file names for the initial section of Suffolk County, for example, would be SHEDFIL.DD, SHEDKEY.DD, SHEDSTA.DD, SHEDSID.DD, SHEDRES.DD, and SHEDLCK.DD. The locking file may be used to prevent access to data for a county if it should be necessary. Also, subroutine HEDOPN performs a series of checks on the initial records of the data file, as well as its index table files each time a county's files are opened. Any inconsistency will cause the subroutine to display the questionable data on the console and

---

[1] b = blank

to lock the files of the county containing the error and to terminate the program. This protects the data from further mishap and retrieval until the problem is corrected.

Only one county may be accessed (opened) at one time, and all programs can switch from one county to another as long as all desired files reside on the same disk. However, it is unlikely that data for more than one county (except Kings and Queens) would reside on one disk; in fact, the data for Nassau and Suffolk Counties may occupy more than one disk.

A chart showing the layout of each of the files and special records for one county is given in figure 5-1. Included are the names of the variables used in the header file programs and their length and type.

Index-Table Files

The index-table files contain the "keys" to locate the record of the desired well in the corresponding header-data file. Although the keys reside on disk, they are read into memory by subroutine HEDOPN to be used for a memory-resident index table whenever the county and type of index table requested is not the same as that in memory. The index files contain an L.W.S. number table, a station-identifier table, a table to automatically retrieve wells in ascending order by station identifier or latitude-longitude, and an unused table.

The ascending-order table simply contains the record numbers of all the wells in a county or section of a county sorted by station identifier (in array IWEL) and latitude-longitude (in array IWELS).

Each L.W.S. number key is derived from the numeric part of the local well number (a real number) and the suffix number (an integer). These numbers are encoded into two integers by subroutine WECODE by placing the four most significant digits of the well number into the first integer (an element in array IWEL) and by placing the last two digits multiplied by 100 plus the two-digit suffix number into the second integer (an element in array IWELS). This reduces the table size by 1/3 to two integer arrays of 3,000 elements each. Note that the position of each key in the table corresponds to the record number where the data for the well may be found, and that the wells and keys are stored in ascending order by local well number.

Station-identifier keys are bit strings encoded from the station identifier by subroutine STAEN. This table must be sequentially searched to find the position of a record since the station-identifier keys are not ordered.

Three words are required for control purposes. The first is an integer called NKEY, which specifies how many keys are currently in the table. The second, called ICKEY, contains the county letter in A1 format, which identifies the county to which the index table applies. The third word, called ITBLE, identifies the type of table; it is 1 for the L.W.S. number table, 2 for the station-identifier table, 3 for the latitude-longitude and station-identifier table, and 4 for the spare table. To read a table into memory as quickly as possible, it is read in by blocks. A block on the Nova computer contains 256 words. Because 2 x 3,000 + 3 words is not a multiple of

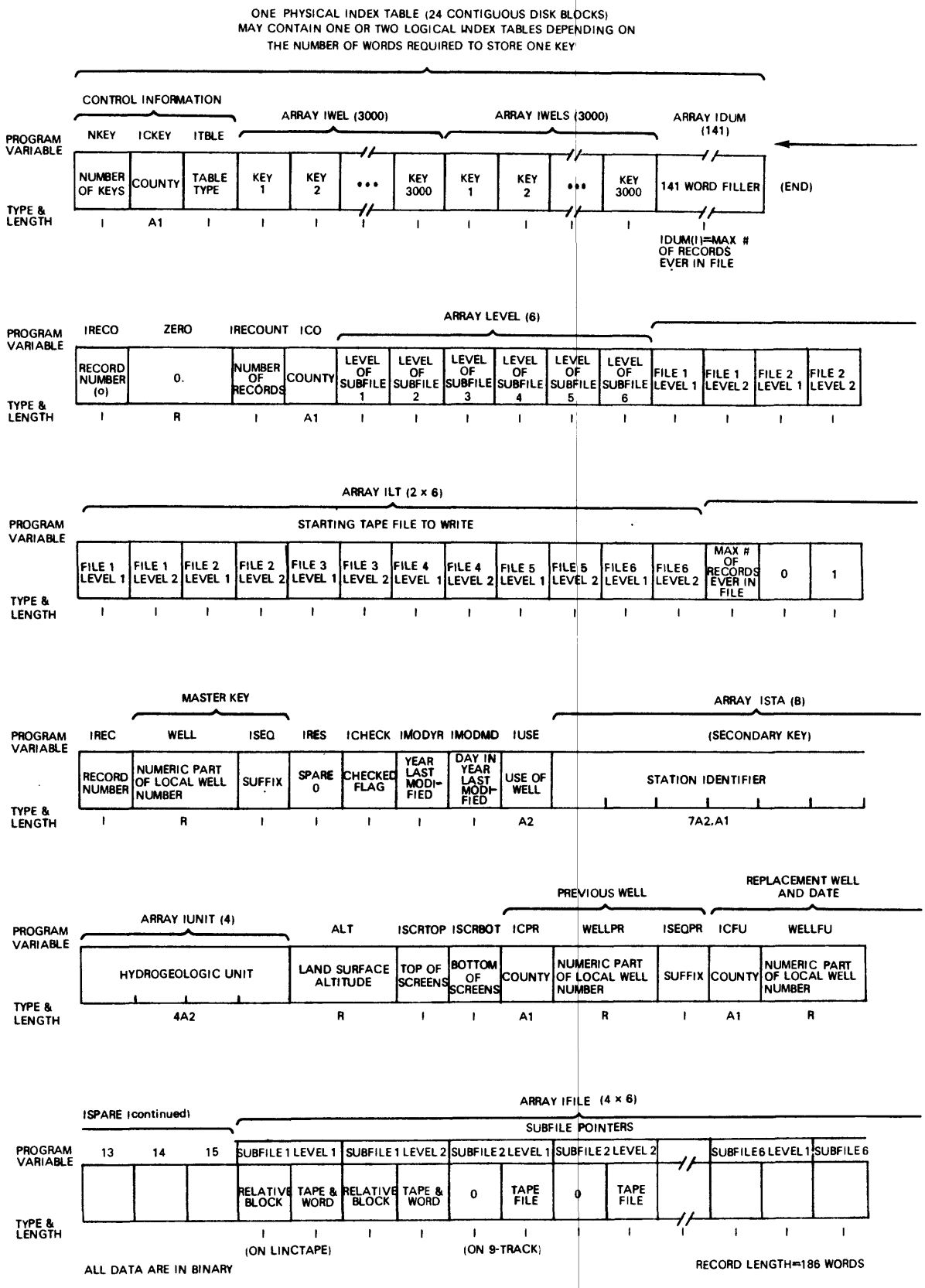
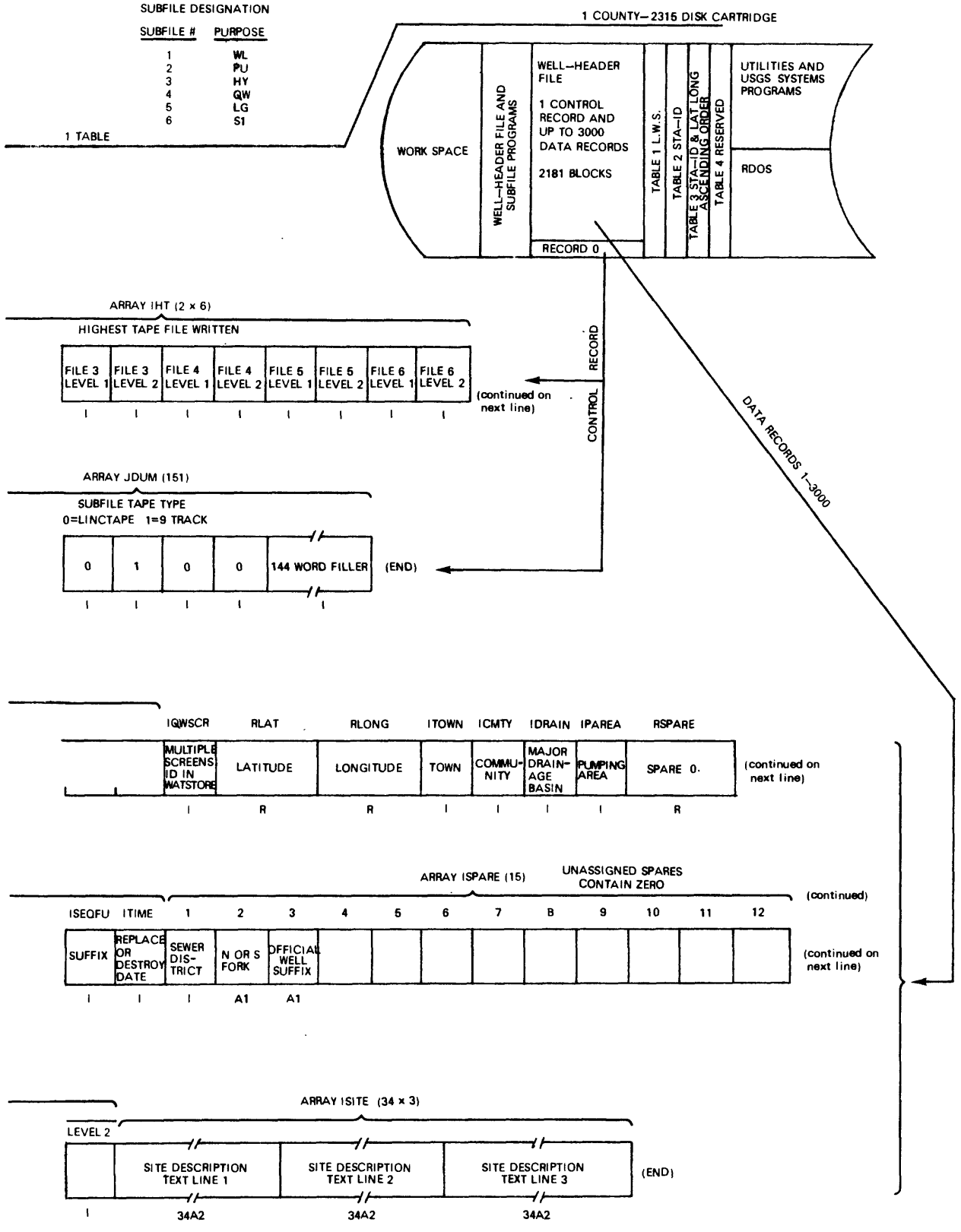


Figure 5-1.--File layout and disk-space allocation



for well-header file.

256, a 141-word dummy filler array (array IDUM) is used to reserve the additional space required to fill the last block. Each county's index table is therefore 24 disk blocks long, organized contiguously for the fastest possible access. It was convenient to store the highest number of keys ever in the table in the first element of array IDUM. The entire table and its control information is opened on FORTRAN channel 1, read into memory, then checked for obvious errors by subroutine HEDOPN. The programmer should not attempt to open or write on FORTRAN channel 1 because the open index table may be destroyed. The table appears in memory in COMMON block HKEYS as follows; a summary of the program variables is given in table 5-1.

```
COMMON/HKEYS/NKEY, ICKEY, ITBLE, IWEL(3000), IWELS(3000), IDUM(141)
```

The subroutine that uses the index table to find well data by L.W.S. number is subroutine HLOC (header locate) and is normally the routine used for this purpose. The desired well's key is located through a binary search and, if needed, a refining sequential search, and the record number is returned. The index table can be used directly from the disk to save memory if required, as discussed later on. Another use for the L.W.S. number index table is to print or otherwise use a list of all wells in the table (and thus in the file) by using subroutine WDCODE to decode each L.W.S. number key in the table back into a real six-digit well number and two-digit integer suffix number. Subroutine HDGET uses subroutine HLOC to find a well and then read data for the desired well into memory.

Table 5-1.--Summary of program variables for index tables

Variable	Contents
NKEY	Number of keys in the table currently in memory.
ICKEY	County letter in A1 format of the table currently in memory.
ITBLE	Type of table currently in memory.
IWEL	Integer array containing the first word of each key (up to 3,000).
IWELS	Integer array containing the second word of each key (up to 3,000).
IDUM	Dummy integer array (except that the first element contains the highest number of keys ever in the table).

Subroutine STALOC finds a well and reads its record into memory using the station identifier for the retrieval key. However, retrieval by station identifier is sequential and is much slower.

Data Files

Each data file is organized randomly or contiguously and is randomly accessible. Each record is 186 words long with one well per record. The file would occupy 2,181 disk blocks of 512 bytes if filled to capacity. Because the Data General system numbers the records in a file starting at zero, it is convenient to use record zero as a control to store information about the other records. This is especially true because the array positions in the index table range from 1 to 3,000, making it theoretically impossible to accidentally destroy record zero. The data file is opened on FORTRAN channel 2 by subroutine HEDOPN.

Control Record

The control record (record zero) is discussed first. This record is read into memory and checked for obvious errors by subroutine HEDOPN. It appears in memory in COMMON block HEAD0 described below; the information content of this record is presented in table 5-2.

```
COMMON/HEAD0/IRECO,ZERO,IRECOUNT,ICO,LEVEL(6),IHT(2,6),ILT(2,6),JDUM(151)
```

Data Record

The final layout to discuss is the layout of each well-header file record in the data file (records 1 to 3,000). There are two buffers in labeled COMMON in which one record may be placed. The COMMON block labeled HEAD is the most frequently used buffer and is the area in which all retrieved well data will be placed by subroutines HDGET and STALOC. The COMMON block labeled AHEAD is an auxiliary buffer available for use if required. This buffer is used primarily by program WHDUPD when a well is updated because the existing well occupies the primary buffer, so that an auxiliary buffer of updates to that well is required. Block AHEAD would not generally be required in a retrieval program.

Each well-header-file record contains a place to store pointers to data in six subfiles. Two levels of pointers are available for each subfile. The level for a subfile is alternated between 1 and 2 after the subfile is merged. Only the current level of pointers is used for retrieving subfile data, but the previous level of pointers provides a backup. The data-base manager can instantly negate the results of the most recent subfile merge by changing the level for that subfile. This allows retrieval and recovery from the previous set of tapes.

The names of the variables in both buffers are similar. Typically, integers in the primary buffer begin with letter I, and those in the auxiliary buffer begin with M. Real variables are not as consistent but will begin either with R or X or will have an X prefixed to the variable name in the auxiliary buffer. The COMMON blocks appear in memory as follows; the contents of the corresponding variables in each buffer are given in table 5-3.

```
C WELL-HEADER FILE RECORDS 1-3000, 186 WORDS.
      COMMON/HEAD/IREC, WELL, ISEQ, IRES, ICHECK, IMODYR, IMODMD, IUSE,
     1 ISTA(8), IQWSCR, RLAT, RLONG, ITOWN, ICMTY, IDRAIN, IPAREA,
     2 RSPARE, IUNIT(4), ALT, ISCRTOP, ISCRBOT, ICPR, WELLPR, ISEQPR,
     3 ICFU, WELLFU, ISEQFU, ITIME, ISPARE(15), IFILE (4,6), ISITE (34,3)
C
C AUXILIARY WELL-HEADER FILE RECORDS 1-3000, 186 WORDS.
      COMMON/AHEAD/MREC, XWELL, MSEQ, MRES, MCHECK, MODYR, MODMD, MUSE,
     1 MSTA(8), MQWSCR, XLAT, XLONG, MTOWN, MCMTY, MDRAIN, MPAREA,
     2 XSPARE, MUNIT(4), XALT, MSCRTOP, MSCRBOT, MCPR, XWELLPR, MSEQPR,
     3 MCFU, XWELLFU, MSEQFU, MTIME, MSPARE(15), MFILE (4,6), MSITE (34,3)
```

Table 5-2.--Content of control record in data file.

VARIABLE	CONTENTS
IRECO	Record number (always zero for this record).
ZERO	Contains number zero.
IRECOUNT	Current number of records in file (excluding record zero). This must agree with the contents of NKEY in index tables.
ICO	County letter in A1 format of data file currently open. (This must also agree with contents of ICKEY in index tables).
LEVEL	Array whose elements contain the level of each of the six subfiles. Each subfile may either be on level 1 or level 2, and the level is switched each time new data are merged into the subfile. The level is needed to determine which set of subfile pointers and which set of tape file names to use.
IHT	Array whose elements contain the highest tape file written in each of the two levels in each of the six subfiles.
ILT	Array whose elements contain the starting tape file to write in each of the two levels of each of the six subfiles.
JDUM	A dummy integer array to fill out record zero to 186 words. JDUM(1) contains the highest number of records ever in the file and should agree with IDUM(1) in the index tables. JDUM(2) through JDUM(7) contain a 0 or a 1 to indicate whether the corresponding subfile is stored on Linctape or 9-track tape, respectively.

Table 5-3.--Content of data record in data file.

Variable in Buffer HEAD	Variable in Buffer AHEAD	Contents
IREC	MREC	Record number that is currently in the buffer.
WELL	XWELL	Numeric part of local well number. (County letter may be obtained from IC0 in control record since all wells are stored by county).
ISEQ	MSEQ	Suffix number (last two digits of L.W.S. number).
IRES	MRES	Zero (reserved for program control purposes).
ICHECK	MCHECK	Status flag: (0 = checked, 1 = unchecked).
IMODYR	MODYR	Year (2 digits) in which well's record was last modified.
IMODMD	MODMD	Relative day number (1-365 or 366) within year that well's record was last modified.
IUSE	MUSE	Use of well in A2 format.
ISTA	MSTA	Station identifier in 7A2, A1 format.
IQWSCR	MQWSCR	The data available in WATSTORE indicator times 10 plus multiple screens indicator. Both indicators are 0 for no and 1 for yes.

In an applications program, the "data in WATSTORE indicator" is obtained by dividing IQWSCR by 10, and the multiple screen indicator is obtained by:

a) IQWSCR - IQWSCR/10*10, or

b) ANDing with one, or

c) checking for 0 or 1 modulus 2, or

d) checking IQWSCR for equality to 1 or 11.

Table 5-3.--Content of data record in data file.--continued

Variable in Buffer HEAD	Variable in Buffer AHEAD	Contents
RLAT	XLAT	Latitude of well, in decimal degrees. Example, 40°30'30" = 40.50833.
RLONG	XLONG	Longitude of well, in decimal degrees.
ITOWN	MTOWN	Town in which well is located.
ICMTY	MCMTY	Community in which well is located.
IDRAIN	MDRAIN	Major drainage basin in which well is located.
IPAREA	MPAREA	Pumping area in which well is located.
RSPARE	XSPARE	Zero. (Reserved for program control purposes).
IUNIT	MUNIT	Hydrogeologic unit, in 4A2 format.
ALT	XALT	Land-surface altitude.
ISCRTOP	MSCRTOP	Top of screened interval(s).
ISCRBOT	MSCRBOT	Bottom of screened interval(s).
ICPR WELLPR ISEQPR	MCPR XWELLPR MSEQPR	L.W.S. number of well that this well replaces. If there is none, ICPR will be blank, and WELLPR and ISEQPR will contain zero.
ICFU WELLFU ISEQFU	MCFU XWELLFU MSEQFU	L.W.S. number of well that replaces this well. If there is none, ICFU will be blank, and WELLFU and ISEQFU will contain zero. (If current well has been destroyed, WELLFU will contain -1 instead of zero.)
ITIME	MTIME	Well's replacement (or destruction) date. It is the 2-digit year X 100 plus month.
ISPARE	MSPARE	15 words reserved for future data expansion. Their current contents are described in the footnote (on next page) because they are subject to change.

Table 5-3.--Content of data record in data file.--continued

Variable in Buffer HEAD	Variable in Buffer AHEAD	Contents
IFILE	MFILE	Subfile pointers to data in each of the two levels in each of the six subfiles. For example, for subfile 5, the pointers for level 1 are in IFILE (1,5) and IFILE (2,5), and the pointers for level 2 are in IFILE (3,5) and IFILE (4,5). For example, in level 1 for Linctape, IFILE (1,5) contains relative block number in file on Linctape in which data are stored (file number on 9-track tape). This number may range from 0-399 and must be adjusted by the starting block number of the data when it is read from Linctape; that is, Linctape starting block plus header-file relative block equals absolute Linctape block. IFILE (2,5) contains the word within the block X 100 plus Linctape file number (or 9-track tape name). Starting word may range from 0-255, and tape number may range from 1-26. IFILE (1,5) and IFILE (2,5) will contain zero if no data on the well are stored in subfile 5 level 1.
ISITE	MSITE	Site-description text field divided into three lines of 68 characters. Each line is in 34A2 format.

NOTE: The array ISPARE of spare locations is currently assigned as follows:

Element of ISPARE	Contents
1	Sewer district in which well is located.
2	North or South Fork indicator. For Suffolk County wells, this field will contain N or S in A1 format if well is on North or South Fork and will contain blanks for all other counties.
3	Official well suffix letter in A1 format (T, D, A, B, C, or blank).
4-15	Zero. (currently unassigned).

WELL RETRIEVAL BY L.W.S. NUMBER

A listing of program WHDSHELL (a "shell" retrieval program for the well-header file) is provided in table 5-4. The shell retrieval program contains the minimum FORTRAN statements required to begin a retrieval program, retrieve data on one or more wells, and to end properly. All a programmer needs to do to convert the shell retrieval program into an actual application program is to add the statements required for the given application, along with any extra necessary beginning or ending logic.

The program listing begins with COMMON block HEADO, which will always contain the control record of the county that is currently open. This block need not appear if none of the information in the block is of any use to the programmer. The next COMMON block is block HKEYS, which will always contain the index table of L.W.S. numbers of the county that is currently open. This block also need not appear if the table will not be used directly by the programmer. The third block is block HEAD, into which the data about each retrieved well will be placed. This block must always appear.

These COMMON blocks are followed by the executable statements. The call to subroutine HDNAM initializes the well-header file software and reads in the base names for the header files. A COMMENT statement indicates where the programmer is to insert any extra initialization statements; this would include the initialization of variables and any other statements to be executed only once, such as the creating and opening of a disk file. The call to subroutine RLWS begins the main retrieval loop. Each time this subroutine is called, it will return one L.W.S. number. The subroutine asks the operator to choose a method of obtaining L.W.S. numbers the first time it is called.

Three methods of retrieval are available. Method A causes the subroutine to return every well in one county or section of a county; method B is similar, but a starting and ending L.W.S. number may be specified. Both methods require the operator to also select the desired county. Method C instructs the subroutine to read the L.W.S. numbers from an operator-specified file. The well-header file records will be retrieved in the order by which the L.W.S. numbers are provided. In addition, current-well and all-well options are available. If the suffix of an L.W.S. number is zero, the program will attempt to retrieve data for the current well. The current well is defined as the most recent well that has not been replaced or destroyed and is not a test hole, that matches the local well number. If the suffix is 99, all L.W.S. numbers that match the local well number will be returned. The important point is that the FORTRAN statement labeled with 1 must be some statement that obtains an L.W.S. number to retrieve. The programmer should not overlook the simplicity of replacing the call to subroutine RLWS with a READ statement.

The next statement (IF) checks for the end of the program, because subroutine RLWS sets the variable WELLNO to zero when there are no more L.W.S. numbers to return. The call to subroutine HDGET attempts to retrieve the desired well-header file record. Variable IER contains the result of the call. If IER is negative, either the required well-header files were not found or were locked. If IER contains zero, the files were found and opened, but the desired well was not found. If IER is positive, it means that the desired well was found and the data retrieved, and the record for the well is

Table 5-4.--List of program WHDSHELL.

```
C WELL-HEADER FILE "SHELL" RETRIEVAL PROGRAM BY L.W.S. NUMBER.
C FORTRAN CHANNELS 1, 2, AND 12 ARE IN USE BY THE WELL-HEADER FILE.
C
C WELL-HEADER FILE RECORD 0, CONTROL RECORD.
      COMMON/HEAD0/IREC0,ZERO,IRECOUNT,IC0,LEVEL(6),IHT(2,6),
     1    ILT(2,6),JDUM(151) ;186 WORDS.
C
C WELL HEADER KEY FILE, 24 BLOCKS LONG.
      COMMON/HKEYS/NKEY,ICKEY,ITBLE,IWEL(3000),IWELS(3000),IDUM(141)
C
C
C
C WELL-HEADER FILE RECORDS 1-3000, 186 WORDS.
      COMMON/HEAD/IREC,WELL,ISEQ,IRES,ICHECK,IMODYR,IMODMD,IUSE,
     1    ISTA(8),IQWSCR,RLAT,RLONG,ITOWN,ICNTY,IDRAIN,IPAREA,
     2    RSPARE,IUNIT(4),ALT,ISCRTOP,ISCRBOT,ICPR,WELLPR,ISEQPR,
     3    ICFU,WELLFU,ISEQFU,ITIME,ISPARE(15),IFILE(4,6),ISITE(34,3)
C
C
      KOUNT=0
      CALL HDNAM
C
C USER INITIALIZATION CODE GOES HERE.
C
C MAIN RETRIEVAL LOOP.
1     CALL RLWS(IC,WELLNO,JSEQ)
      IF(WELLNO.LE.0.)GO TO 100
      CALL HDGET(IC,WELLNO,JSEQ,IER)
      IF(IER)1,3,2
2     CONTINUE
C
C USER APPLICATION CODE GOES HERE.
C
      KOUNT=KOUNT+1
      GO TO 1
C NOT FOUND.
3     WRITE(10,4)IC,WELLNO,JSEQ
4     FORMAT(1X,'WELL ',A1,F7.0,I2,' NOT FOUND.')
      GO TO 1
C END.
100   WRITE(10,7)KOUNT
7     FORMAT(1X,I5,' WELLS HAVE BEEN RETRIEVED AND PROCESSED.')
C
C USER END OF PROGRAM CODE GOES HERE.
C
      CALL RESET
      CALL BACK
      END
```

available for use in COMMON block HEAD. The next COMMENT indicates the position at which the programmer should enter the statements required for the application. The program logic passes through this point for each well retrieved. The rest of the program is self-explanatory until the last COMMENT. The program transfers control to statement 100 after data for the last well have been retrieved. Most applications will probably require that the program simply terminate at this point. However, some applications may require some statements to be entered, for example, to close a disk file. The program maintains a running count (in KOUNT) of the number of wells retrieved and displays this number on the console at the end of the program. The well count may be useful in certain applications.

To create a new application program, the programmer need only copy file WHDSHELL.FR into some other appropriately named file and use the text editor to add the required statements. After the new program has been compiled from the FORT command, the new savefile must be created. The minimum command line to create a savefile is shown below assuming that the new program is named MAIN. Any subprograms or library routines added to the program by the programmer must also be added to the command line.

```
RLDR MAIN HDNAM RLWS HDCURW HDGET HLOC HDCKF

HDDOPN WECODE WDCODE UTIL.LB FORT.LB
```

Note that the above well-header-file software will usually be maintained only on the well data base program-development disk. Also, all new programs should be thoroughly tested on the test-data files on that disk before the program is applied to the "live" data files on other disks. Again, in a retrieval program, no "writes" should be issued on FORTRAN channels 1 or 2.

STATION-IDENTIFIER ENCODING

Each 15-character station identifier is uniquely encoded into two integers by subroutine STAEN for use in the station-identifier index table. The method used is illustrated in figure 5-2. Note that the groups of characters are converted to their binary numeric representations before being placed into the integers.

This method requires that the sequence number of the station identifier be less than or equal to 63 since only six bits are available to store it. Since Long Island station identifiers do not span a full degree of latitude and span only four degrees of longitude, several digits of the station identifier can be ignored. The minimum uniquely representable station identifier is 403000071000000, and the maximum is 412959074595963.

WELL RETRIEVAL BY STATION IDENTIFIER

It may occasionally be necessary to retrieve well data by station identifier. The easiest way to do this is to use the application program WSDCNV to convert a list of station identifiers into L.W.S. numbers, but

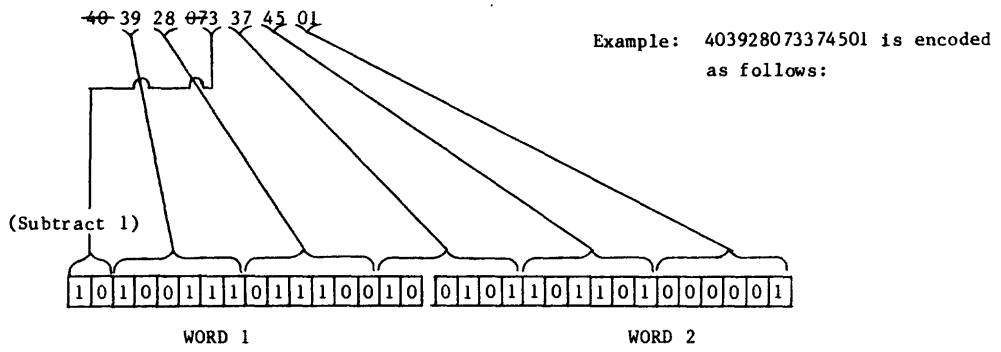


Figure 5-2.--Station-identifier encoding.

direct retrieval is also possible. A shell retrieval program called WSDSHELL for retrieval by station identifier is illustrated in table 5-5. Only two basic changes are needed. First, the call to subroutine RLWS has been replaced by a READ statement to obtain the county and station identifier. (The program must be told in which county's data file to look for the specified station identifier.) In the sample program (table 5-5), the input card must contain the county letter in column 1 and the station identifier in columns 2-16.

Second, the call to subroutine HDGET is replaced with a call to subroutine STALOC. In this program, COMMON block HKEYS will contain the station identifier index table instead of the L.W.S. number table. The program is written to retrieve all well-header file records in the currently open file that match the station identifier. There should be only one, but if not, the program will not stop after retrieving only the first matching record. The minimum load command to create a savefile for the program illustrated is:

```
RLDR MAIN HDNAM STALOC STAEN HEDOPN UTIL.LB FORT.LB
```

Many of the well-header file software routines are described in table 5-6, at the end of this section.

PROGRAM TERMINATION

All well-header file programs end with a call to RESET, which closes all open files, and a call to BACK, which returns control to the program at the next higher level. All new programs should also be terminated by this method instead of by issuing a STOP or a call to EXIT. This procedure allows any program to swap to any of the other well-header file programs and then return control to the calling program--often a very useful feature.

Table 5-5.--List of program WSDSHELL.

```
C WELL-HEADER FILE "SHELL" RETRIEVAL PROGRAM BY STATION ID.
C FORTRAN CHANNELS 1, 2, AND 12 ARE IN USE BY THE WELL-HEADER FILE.
C
C WELL-HEADER FILE RECORD 0, CONTROL RECORD.
      COMMON/HEAD0/IRECO,ZERO,IRECOUNT,ICO,LEVEL(6),IHT(2,6),
     1    ILT(2,6),JDUM(151) ;186 WORDS.
C
C WELL HEADER KEY FILE, 24 BLOCKS LONG.
      COMMON/HKEYS/NKEY,ICKEY,ITBLE,IWEL(3000),IWELS(3000),IDUM(141)
C
C
C
C WELL-HEADER FILE RECORDS 1-3000, 186 WORDS.
      COMMON/HEAD/IREC,WELL,ISEQ,IRES,ICHECK,IMODYR,IMODMD,IUSE,
     1    ISTA(8),IQWSCR,RLAT,RLONG,ITOWN,ICNTY,IDRAIN,IPAREA,
     2    RSPARE,IUNIT(4),ALT,ISCRTOP,ISCRBOT,ICPR,WELLPR,ISEQPR,
     3    ICFU,WELLFU,ISEQFU,ITIME,ISPARE(15),IFILE(4,6),ISITE(34,3)
      DIMENSION JSTA(8)
      KOUNT=0
      CALL HDNAM
C
C
C
C USER INITIALIZATION CODE GOES HERE.
C
C MAIN RETRIEVAL LOOP.
1     READ(9,5,END=100)IC,(JSTA(I),I=1,8)
5     FORMAT(A1,7A2,A1)
      ISTRT=1
8     CALL STALOC(IC,JSTA,ISTRT,IER)
      IF(IER)1,3,2
2     CONTINUE
C
C USER APPLICATION CODE GOES HERE.
C
      KOUNT=KOUNT+1
      GO TO 8
C NOT FOUND.
3     IF(ISTRT.NE.1)GO TO 1
      WRITE(10,4)IC,(JSTA(I),I=1,8)
4     FORMAT(1X,'WELL ',A1,7A2,A1,' NOT FOUND.')
      GO TO 1
C END.
100   WRITE(10,7)KOUNT
7     FORMAT(1X,I5,' WELLS HAVE BEEN RETRIEVED AND PROCESSED.')
C
C USER END OF PROGRAM CODE GOES HERE.
C
      CALL RESET
      CALL BACK
      END
```

OBTAINING ADDITIONAL MEMORY

The minicomputer on which the well data base is implemented has a memory size of 32K 16-bit words. About 11,500 of these are used by the default-operating system. This means that with the index table in memory, only about 15,000 words of memory are available to the programmer. A smaller system is available that uses about 3,000 fewer words of memory.

If one has written an application that does not fit in memory with the default-operating system, and running it under the smaller operating system is not appropriate or the program does not fit into memory with that system, an alternative approach, other than using overlays or swapping to another program, is available. As discussed previously, one index table is normally read into memory. (The binary search of the memory-resident table of integer L.W.S. numbers provides a fast retrieval speed.) If a sacrifice can be made in retrieval speed, 6141 more words of memory can be made available to the program by searching the L.W.S. number table directly on disk. This is done by the following steps:

1. Change the COMMON block HKEYS in the main program (if there)

   from: COMMON/HKEYS/NKEY,ICKEY,ITBLE,IWEL(3000),IWELS(3000),IDUM(6141)

   to : COMMON/HKEYS/NKEY,ICKEY,ITBLE.

2. Substitute the relocatable binary files when creating the savefile for the program

   from: RLWS, HDCURW, HLOC, and HEDOPN

   to : DRLWS, DHDCURW, DHLOC, and DHEDOPN.

Now the retrieval program will not require large arrays to hold an index table. Although the retrieval method is different, the names of the subroutines in these files are the same, so that the disk versions can simply be substituted.

The time needed for subroutine HLOC to locate a well will increase from 0.005 seconds per well to a larger, slower value, which may or may not be acceptable for the application.

The direct-from-disk technique can easily be applied to other retrieval methods by finding where the index table is used and substituting a CALL to FSEEK and a BINARY READ. An example of this can be seen by examining the source of RLWS and DRLWS or HLOC and DHLOC. Subroutine DHEDOPN would not require any additional changes.

Table 5-6.--Well-header file software descriptions.

INDEX

PROGRAM	HD	
PROGRAM	WHDSHELL	(WELL HEADER RETRIEVAL SHELL)
PROGRAM:	WSDSHELL	(WELL HEADER RETRIEVAL SHELL)
SUBROUTINE:	HDNAM	(HEADER NAME INITIALIZATION)
SUBROUTINE:	RLWS	(RETRIEVE L.W.S. NUMBERS)
SUBROUTINE:	DRLWS	(RETRIEVE L.W.S. NUMBERS)
SUBROUTINE:	HDCURW	(RETRIEVE CURRENT WELL)
SUBROUTINE:	DHDCURW	(RETRIEVE CURRENT WELL)
SUBROUTINE:	STALOC	(HEADER LOCATION)
SUBROUTINE:	STAEN	(STATION ID ENCODING)
SUBROUTINE:	HDGET	(HEADER GET)
SUBROUTINE:	HDCKF	(HEADER CHECK)
SUBROUTINE:	HLOC	(HEADER LOCATION)
SUBROUTINE:	HLOCS	(DUAL SUFFOLK HLOC)
SUBROUTINE:	DHLOC	(HEADER LOCATION)
SUBROUTINE:	DHLOCS	(DUAL SUFFOLK DHLOC)
SUBROUTINE:	HEDOPN	(HEADER OPEN)
SUBROUTINE:	DHEDOPN	(HEADER OPEN)
SUBROUTINE:	WECODE	(WELL ENCODE)
SUBROUTINE:	WDCODE	(WELL DECODE)
SUBROUTINE:	STATQWSCR	(WATSTORE/SCREEN SEPARATOR)
SUBROUTINE:	DECLAT	(REAL TO LATITUDE/LONGITUDE)
SUBROUTINE:	CDECLAT	(CHARACTER DECLAT)
DATA FILE:	HDNAMES	(WELL-HEADER FILE NAMES)

Table 5-6.--Well-header-file software descriptions.

Program: HD

LANGUAGE: FORTRAN
AUTHOR: GH
PROJECT: WELL-HEADER FILE
LINCFILE: HD

THIS FILE CONTAINS THE VARIOUS BLOCKS OF LABELED COMMON USED IN MANY OF THE PROGRAMS THAT ACCESS THE WELL-HEADER FILE. THUS THIS FILE CAN BE USED AS A BASIC BUILDING BLOCK WHEN WRITING A NEW PROGRAM. THIS SAVES THE TIME REQUIRED TO RETYPE THE VARIOUS BLOCKS OF COMMON.

Program: WHDSHELL (Well Header Retrieval Shell)

LANGUAGE: FORTRAN
AUTHOR: GH
PROJECT: WELL-HEADER FILE
LINCFILE: WHDSHL

THIS IS A SHELL RETRIEVAL PROGRAM FOR THE RETRIEVAL OF WELL DATA FROM THE WELL-HEADER FILE BY L.W.S. NO. THE PROGRAM CONTAINS THE REQUIRED LABELED COMMON BLOCKS AND THE PROGRAM LOGIC NECESSARY TO START, RETRIEVE WELL DATA, AND STOP. A PROGRAMMER MAY USE THIS FILE TO CREATE A RETRIEVAL APPLICATION PROGRAM BY ADDING THE NECESSARY FORTRAN STATEMENTS. COMMENTS PROVIDED IN THE PROGRAM INDICATE WHERE THESE STATEMENTS MUST BE ENTERED.

SUBROUTINES REQUIRED: HDNAM, RLWS, HDCURW, HDGET, HLOC, HDCKF, HEDOPN, WECODE, WDCODE.
LIBRARIES REQUIRED: UTIL.LB.
DISK DATA FILES REQUIRED: HDNAMES AND AT LEAST ONE COUNTY OF THE WELL-HEADER FILE.

Program: WSDSHELL (Well Header Retrieval Shell)

LANGUAGE: FORTRAN
AUTHOR: GH
PROJECT: WELL-HEADER FILE
LINCFILE: WSDSHL

THIS PROGRAM IS ANOTHER SHELL RETRIEVAL PROGRAM FOR THE RETRIEVAL OF WELL DATA FROM THE WELL-HEADER FILE. IT IS LIKE PROGRAM "WHDSHELL" EXCEPT THAT RETRIEVAL IS BY STATION IDENTIFIER.

SUBROUTINES REQUIRED: HDNAM, STALOC, STAEN, HEDOPN.
LIBRARIES REQUIRED: UTIL.LB.
DISK DATA FILES REQUIRED: HDNAMES AND AT LEAST ONE COUNTY OF THE WELL-HEADER FILE.

Subroutine: HDNAM (Header Name Initialization)

LANGUAGE: FORTRAN
AUTHOR: GH
PROJECT: WELL-HEADER FILE
LINCFILE: HDNAM

THIS SUBROUTINE CHECKS WHETHER THE WELL-HEADER FILES ARE LOCKED AND, IF NOT, IT INITIALIZES THE BASE NAMES OF THE HEADER FILE FROM DISK FILE "HDNAMES" AND OPENS FORTRAN CHANNEL 12 FOR APPENDING TO DISK FILE "$WHDPRT." ALL DATA ARE RETURNED IN LABELED COMMON BLOCK "HNM."
LIBRARIES REQUIRED: UTIL.LB.

Table 5-6.--Well-header-file software descriptions.--continued

Subroutine: RLWS (Retrieve L.W.S. Numbers)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: CH LINCFILE: RLWS

THIS SUBROUTINE RETURNS ONE L.W.S. NUMBER EACH TIME IT IS CALLED FOR USE BY A WELL RETRIEVAL PROGRAM. THE FIRST TIME IT IS CALLED, THE SUBROUTINE WILL ASK THE OPERATOR THE METHOD TO USE FOR OBTAINING L.W.S. NUMBERS. EITHER ALL WELLS IN ONE COUNTY, OR SOME OF THE WELLS IN ONE COUNTY, OR A RANDOM LIST OF L.W.S. NUMBERS MAY BE SELECTED. WHEN RETRIEVAL METHOD "C" IS SELECTED AND THE SUFFIX OF AN L.W.S. NUMBER IS ENTERED AS ZERO, THE SUBROUTINE WILL ATTEMPT TO RETURN THE L.W.S. NUMBER OF THE CURRENT WELL. THE CURRENT WELL IS DEFINED AS THE MOST RECENT WELL THAT HAS NOT BEEN REPLACED OR DESTROYED, AND IS NOT A TEST HOLE. IF THE SUFFIX ENTERED IS 99, THEN ALL L.W.S. NUMBERS THAT MATCH THE LOCAL WELL NUMBER WILL BE RETURNED. A ZERO WELL NUMBER IS RETURNED WHEN NO MORE L.W.S. NUMBERS MATCH THE RETRIEVAL SPECIFICATIONS.

ARGUMENTS(IC,WELLNO,JSEQ). (ALL ARE RETURNED).
IC - COUNTY LETTER IN "A1" FORMAT.
WELLNO - NUMERIC PART OF LOCAL WELL NUMBER.
JSEQ - SUFFIX NUMBER.
SUBROUTINES REQUIRED: HDCURW, HDGET, HDCKF, HLOC, WECODE, WDCODE, HEDOPN.
LIBRARIES REQUIRED: UTIL.LB.

Subroutine: DRLWS (Retreive L.W.S. Numbers)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: CH LINCFILE: DRLWS

THIS SUBROUTINE, ACTUALLY NAMED "RLWS," IS THE SAME AS SUBROUTINE "RLWS" EXCEPT THAT THE INDEX TABLE FOR RETRIEVAL DOES NOT RESIDE IN MEMORY THUS SAVING ABOUT 6,000 WORDS OF MEMORY. SEE SUBROUTINE "RLWS" (ABOVE).
SUBROUTINES REQUIRED: DHDCURW, HDGET, HDCKF, DHLOC, WECODE, WDCODE, DHEDOPN.
LIBRARIES REQUIRED: UTIL.LB.

Subroutine: HDCURW (Retrieve Current Well)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: CH LINCFILE: HDCURW

THIS SUBROUTINE LOCATES AND RETRIEVES THE CURRENT WELL FROM THE WELL-HEADER FILE USING THE LOCAL WELL NUMBER AS THE RETRIEVAL KEY INSTEAD OF THE L.W.S. NUMBER. THE CURRENT WELL IS DEFINED AS THE MOST RECENT WELL WITH THE SPECIFIED LOCAL WELL NUMBER THAT HAS NOT BEEN REPLACED OR DESTROYED, AND IS NOT A TEST HOLE.

Table 5-6.--Well-header file software descriptions.--continued

```
ARGUMENTS (IC,WELLNO,ICURR,IER).
  IC      - COUNTY LETTER IN "A1" FORMAT.
  WELLNO  - NUMERIC PART OF LOCAL WELL NUMBER.
  ICURR   - WILL CONTAIN THE SUFFIX NUMBER OF THE CURRENT WELL AFTER THE
            CALL.  IT IS NOT USED BY THE SUBROUTINE TO RETRIEVE THE
            WELL.
  IER     - ERROR INDICATOR:
            <1 = NO CURRENT WELL COULD BE LOCATED.
            +N = A CURRENT WELL WAS FOUND AND WAS READ FROM RECORD "N".
SUBROUTINES REQUIRED:  HDGET, HDCKF, HLOC, WECODE, WDCODE, HEDOPN.
LIBRARIES REQUIRED:  UTIL.LB.
```

Subroutine: DHDCURW (Retrieve Current Well)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: DHDCRW

THIS SUBROUTINE, WHICH IS ACTUALLY NAMED "HDCURW" IS THE SAME AS SUBROUTINE "HDCURW" EXCEPT THAT THE INDEX TABLE FOR RETRIEVAL DOES NOT RESIDE IN MEMORY THUS SAVING ABOUT 6,000 WORDS OF MEMORY. SEE SUBROUTINE "HDCURW".

SUBROUTINES REQUIRED: DHLOC AND DHEDOPN INSTEAD OF HLOC AND HEDOPN.

Subroutine: STALOC (Header Location)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: STALOC

THIS SUBROUTINE LOCATES AND RETRIEVES DATA FOR A WELL FROM THE WELL-HEADER FILE BY ITS STATION IDENTIFIER. THE INFORMATION WILL BE RETURNED IN LABELED COMMON BLOCK "HEAD."

```
ARGUMENTS(IC,JSTA,ISTRT,IER).
  IC     - COUNTY LETTER IN "A1" FORMAT.
  JSTA   - THE NAME OF THE ARRAY DIMENSIONED TO 8 WHICH CONTAINS THE
           DESIRED WELL'S STATION IDENTIFIER IN "A2" FORMAT.
  ISTRT  - THE ARRAY POSITION IN THE STATION IDENTIFIER INDEX TABLE
           TO BEGIN THE SEARCH.  "ISTRT" SHOULD BE SET TO 1 THE FIRST
           TIME A SEARCH IS MADE FOR A NEW STATION IDENTIFIER.
           "ISTRT" WILL BE UPDATED TO THE NEXT POSITION IN THE INDEX
           TABLE IF THE DESIRED WELL WAS FOUND.  THIS ALLOWS "STALOC"
           TO BE REPEATEDLY CALLED TO FIND MORE THAN ONE WELL WITH
           THE SAME STATION IDENTIFIER.  NOTE THAT THIS IMPLIES THAT
           "ISTRT" MUST BE A VARIABLE.
  IER    - RETRIEVAL INDICATOR:
           -1 = WELL-HEADER FILES LOCKED, OR NOT FOUND.
            0 = SPECIFIED WELL NOT FOUND.
           +N = WELL WAS RETRIEVED FROM RECORD "N".
SUBROUTINES REQUIRED: HEDOPN, STAEN.
LIBRARIES REQUIRED: UTIL.LB.
```

Table 5-6.--Well-header file software descriptions.--continued

Subroutine: STAEN (Station ID Encoding)

LANGUAGE: ASSEMBLY PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: STAEN

THIS SUBROUTINE UNIQUELY ENCODES A 15-CHARACTER LONG ISLAND STATION IDENTIFIER INTO 2 INTEGERS FOR USE IN AN INDEX TABLE. THE STATION IDENTIFIER SHOULD NORMALLY BE 15 CHARACTERS LONG. NUMERIC CHARACTERS ARE ASSUMED, BUT THERE IS A PROVISION TO TREAT ALL EMBEDDED BLANKS (EXCEPT COLUMN 1) AS IF THEY WERE ZEROS. THE 16TH CHARACTER IS IGNORED. HOWEVER, IF THE LEADING "4" IS OMITTED, THE SUBROUTINE WILL ASSUME THAT IT WAS OMITTED AND STILL ENCODE THE REMAINING 14 CHARACTERS PROPERLY. "I1" AND "I2" WILL BE SET TO ZERO IF THE FIRST CHARACTER OF "ISTA" IS A BLANK, WHICH INDICATES A MISSING STATION IDENTIFIER. NO CHECKS ARE PERFORMED, AND THE LAST 2 CHARACTERS OF THE STATION IDENTIFIER (SEQUENCE NUMBER) MUST NOT EXCEED 63, OR THE ENCODED INTEGERS MAY NOT BE UNIQUE.

ARGUMENTS(ISTA,I1,I2).
ISTA - THE NAME OF THE ARRAY DIMENSIONED TO 8 WHICH CONTAINS THE STATION IDENTIFIER IN "A2" FORMAT.
I1 - THE FIRST ENCODED INTEGER.
I2 - THE SECOND ENCODED INTEGER.

Subroutine: HDGET (Header Get)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: HDGET

THIS SUBROUTINE RETRIEVES THE DATA FOR A WELL FROM THE WELL-HEADER FILE. THE INFORMATION WILL BE RETURNED IN LABELED COMMON BLOCK "HEAD."

ARGUMENTS(IC,WELLNO,JSEQ,IER).
IC - COUNTY LETTER IN "A1" FORMAT.
WELLNO - NUMERIC PART OF LOCAL WELL NUMBER.
JSEQ - SUFFIX NUMBER.
IER - ERROR INDICATOR:
-1 = TROUBLE, OR WELL-HEADER FILES NOT FOUND.
0 = WELL NOT FOUND.
+N = WELL WAS READ AND WAS FOUND AT RECORD "N".
SUBROUTINES REQUIRED: HLOC, HEDOPN, HDCKF, WECODE, WDCODE.
LIBRARIES REQUIRED: UTIL.LB.

Subroutine: HDCKF (Header Check)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: HDCKF

THIS SUBROUTINE CHECKS THE WELL RECORD REQUESTED AGAINST THE WELL RECORD ACTUALLY RETRIEVED TO DETECT RETRIEVAL ERRORS.

Table 5-6.--Well-header file software descriptions.--continued

```
ARGUMENTS(IC,W1,W2,IS1,IS2,IR1,IR2,IER).
  IC  - COUNTY LETTER IN "A1" FORMAT.
  W1  - WELL NUMBER REQUESTED.
  W2  - WELL NUMBER RETRIEVED.
  IS1 - SUFFIX NUMBER REQUESTED.
  IS2 - SUFFIX NUMBER RETRIEVED.
  IR1 - RECORD NUMBER REQUESTED.
  IR2 - RECORD NUMBER RETRIEVED.
  IER - ERROR INDICATOR:
        -1 = ERROR DETECTED.
         0 = NO ERROR DETECTED.
```

Subroutine: HLOC (Header Location)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: HLOC

THIS SUBROUTINE INDICATES THE RECORD NUMBER IN THE WELL-HEADER FILE WHICH CONTAINS DATA FOR A GIVEN WELL BY USING A BINARY SEARCH THROUGH A MEMORY-RESIDENT INDEX TABLE. IF NECESSARY, A CALL WILL BE MADE TO SUBROUTINE "HEDOPN" TO CHANGE TO A DIFFERENT COUNTY. THIS SUBROUTINE LOADS SUBROUTINE "HEDOPN" AS AN OVERLAY WHEN COMPILED USING "FORT/X". THIS SUBROUTINE MAY BE USED AS AN OVERLAY NAMED "VHLOC."

```
ARGUMENTS(IC,WELLNO,ISEQ,IREC,IP).
  IC     - COUNTY LETTER IN "A1" FORMAT.
  WELLNO - WELL NUMBER DESIRED.
  ISEQ   - SUFFIX NUMBER DESIRED.
  IREC   - RECORD INDICATOR:
           -1 = REQUIRED HEADER OR HEADER INDEX FILES NOT FOUND, HEADER
                FILES ARE LOCKED, OR AN INVALID COUNTY WAS GIVEN.
            0 = THE DESIRED WELL WAS NOT FOUND.
           +N = THE DESIRED WELL WAS FOUND TO EXIST IN THE HEADER FILE
                CURRENTLY OPEN AT RECORD "N".
  IP     - INSERTION RECORD INDICATOR. WHEN "IREC" IS ZERO, "IP"
           WILL CONTAIN THE APPROXIMATE RECORD NUMBER WHERE THE
           GIVEN WELL SHOULD BE IF IT WERE TO BE INSERTED INTO THE
           FILE.  "IP" MUST BE CAREFULLY REFINED TO THE EXACT
           LOCATION BY SEARCHING THROUGH THE HEADER FILE.  THE VALUE
           OF "IP" IS MEANINGLESS IF "IREC" IS NOT ZERO.
SUBROUTINES REQUIRED: HEDOPN, WECODE, WDCODE.
LIBRARIES REQUIRED: UTIL.LB.
```

Subroutine: HLOCS (Dual Suffolk HLOC)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: HLOCS

Table 5-6.--Well-header file software descriptions.--continued

THIS SUBROUTINE IS THE SAME AS SUBROUTINE "HLOC" EXCEPT THAT IT CAN USE TWO DISKS WHEN RETRIEVING FROM SUFFOLK COUNTY. THIS ABILITY APPLIES ONLY WHEN RETRIEVING WELLS BY "C" RETRIEVAL. THE LOW SUFFOLK SECTION (WELLS S1 TO S39,999) MUST BE IN DRIVE ZERO, AND THE UPPER SUFFOLK SECTION (WELLS S40,000 AND UP) MUST BE IN DRIVE ONE. USE THIS SUBROUTINE FOR RETRIEVAL ONLY. DO NOT USE IT IN ANY UPDATING PROGRAMS. NOTE THAT THE ACTUAL NAME OF THE SUBROUTINE IS "HLOC" SO THAT IT MAY BE EASILY SUBSTITUTED.

Subroutine: DHLOC (Header Location)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: DHLOC

THIS SUBROUTINE, ACTUALLY NAMED "HLOC," IS THE SAME AS SUBROUTINE "HLOC" EXCEPT THAT THE INDEX TABLE FOR RETRIEVAL DOES NOT RESIDE IN MEMORY, THUS SAVING ABOUT 6,000 WORDS OF MEMORY. SEE SUBROUTINE "HLOC."

SUBROUTINES REQUIRED: DHEDOPN INSTEAD OF HEDOPN.

Subroutine: DHLOCS (Dual Suffolk DHLOC)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: DHLOCS

THIS SUBROUTINE IS THE SAME AS SUBROUTINE "DHLOC" EXCEPT THAT IT CAN USE TWO DISKS WHEN RETRIEVING FROM SUFFOLK COUNTY. THIS ABILITY APPLIES ONLY WHEN RETRIEVING WELLS BY "C" RETRIEVAL. THE LOW SUFFOLK SECTION (WELLS S1 TO S39,999) MUST BE IN DRIVE ZERO, AND THE UPPER SUFFOLK SECTION (WELLS S40,000 AND UP) MUST BE IN DRIVE ONE. USE THIS SUBROUTINE FOR RETRIEVAL ONLY. DO NOT USE IT IN ANY UPDATING PROGRAMS. NOTE THAT THE ACTUAL NAME OF THE SUBROUTINE IS "HLOC" SO THAT IT MAY BE EASILY SUBSTITUTED.

Subroutine: HEDOPN (Header Open)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: HEDOPN

THIS SUBROUTINE CLOSES THE CURRENTLY OPEN WELL-HEADER FILE AND INDEX TABLE AND OPENS THE WELL-HEADER FILE FOR THE DESIRED COUNTY ON FORTRAN CHANNEL 2, OPENS THE APPROPRIATE WELL INDEX TABLE ON FORTRAN CHANNEL 1, AND READS THE TABLE INTO MEMORY. MANY CHECKS ARE MADE TO INSURE THE INTEGRITY OF THE DATA AND TO BE SURE THAT THE HEADER FILES ARE NOT LOCKED. A FATAL ERROR WILL CAUSE THE ERRONEOUS COUNTY'S HEADER FILE TO BE LOCKED FOLLOWED BY IMMEDIATE PROGRAM TERMINATION.

ARGUMENTS(JC,ITYPE,IER).
JC - COUNTY LETTER IN "A1" FORMAT OF THE COUNTY TO OPEN.

Table 5-6.--Well-header file software descriptions.--continued

ITYPE - RETRIEVAL TABLE DESIRED:
1 = LOAD L.W.S. NUMBER INDEX TABLE.
2 = LOAD STATION IDENTIFIER INDEX TABLE.
3 = LOAD RECORD NUMBER TABLES FOR RETRIEVAL IN ASCENDING ORDER BY STATION ID, OR LATITUDE LONGITUDE.
4 = NOT ASSIGNED.
IER - ERROR INDICATOR:
0 = ONE OR MORE NON-FATAL ERRORS ENCOUNTERED. (INVALID COUNTY, HEADER FILES NOT FOUND, ETC.).
1 = HEADER FILES AND INDEX TABLE ARE OK AND READY FOR USE.
LIBRARIES REQUIRED: UTIL.LB.

Subroutine: DHEDOPN (Header Open)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: DHDOPN

THIS SUBROUTINE, ACTUALLY NAMED "HEDOPN," IS THE SAME AS SUBROUTINE "HEDOPN" EXCEPT THAT THE INDEX TABLE FOR RETRIEVAL DOES NOT RESIDE IN MEMORY, THUS SAVING ABOUT 6,000 WORDS OF MEMORY. SEE SUBROUTINE "HEDOPN."

Subroutine: WECODE (Well Encode)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: WECODE

THIS SUBROUTINE CONVERTS A REAL WELL NUMBER AND AN INTEGER SUFFIX NUMBER INTO 2 INTEGERS. THE INTEGERS CAN BE DECODED BY SUBROUTINE "WDCODE."

ARGUMENTS(WELLNO,ISEQ,I1,I2).
WELLNO - LOCAL WELL NUMBER (1-999999).
ISEQ - SUFFIX NUMBER (1-99).
I1 - WILL CONTAIN THE FIRST 4 DIGITS OF THE WELL NUMBER.
I2 - WILL CONTAIN THE LAST 2 DIGITS OF THE WELL NUMBER TIMES 100 PLUS THE SUFFIX NUMBER.

THIS SUBROUTINE DECREASES THE MEMORY REQUIREMENTS FOR A WELL INDEX TABLE BY 1/3.

Subroutine: WDCODE (Well Decode)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: WDCODE

THIS SUBROUTINE CONVERTS A WELL AND SUFFIX NUMBER STORED AS 2 INTEGERS INTO A REAL WELL NUMBER AND INTEGER SUFFIX NUMBER. THE INPUT INTEGERS SHOULD HAVE BEEN ENCODED BY SUBROUTINE "WECODE."

ARGUMENTS(WELLNO,ISEQ,I1,I2).
WELLNO - WILL CONTAIN THE WELL NUMBER (1-999999).
ISEQ - WILL CONTAIN THE SUFFIX NUMBER (1-99).
I1 - INTEGER WHICH CONTAINS THE FIRST 4 DIGITS OF THE WELL NUMBER.

Table 5-6.--Well-header file software descriptions.--continued

I2 - INTEGER WHICH CONTAINS THE LAST 2 DIGITS OF THE WELL NUMBER AND THE 2 DIGIT SUFFIX NUMBER.

Subroutine: STATQWSCR (WATSTORE/Screen Separator)

LANGUAGE: FORTRAN PROJECT: WELL-HEADER FILE
AUTHOR: SL LINCFILE: QWSCR

THIS SUBROUTINE SEPARATES THE COMBINED DATA IN WATSTORE INDICATOR AND MULTIPLE SCREENS INDICATOR STORED FOR EACH WELL IN THE WELL-HEADER FILE. BOTH INDICATORS ARE ZERO IF NO, AND ONE IF YES.

ARGUMENTS(IQWSCR,IQW,ISCR).
IQWSCR - COMBINED INDICATOR TO SEPARATE.
IQW - SEPARATED DATA IN WATSTORE INDICATOR.
ISCR - SEPARATED MULTIPLE SCREENS INDICATOR.

Subroutine: DECLAT (Real To Latitude/Longitude)

LANGUAGE: FORTRAN PROJECT: GENERAL
AUTHOR: GH LINCFILE: DECLAT

THIS SUBROUTINE DECODES A REAL NUMBER ENCODED BY SUBROUTINE "LATDEC," WHICH CONTAINS A LATITUDE OR A LONGITUDE EXPRESSED IN DECIMAL PARTS OF A DEGREE, INTO 3 INTEGERS. ZERO IS RETURNED IF AN ILLEGAL CONVERSION IS ATTEMPTED. ALL 327,600 POSSIBILITIES HAVE BEEN TESTED BETWEEN 0 AND 90 DEGREES.

ARGUMENTS(X,LD,LM,LS).
X - REAL NUMBER TO CONVERT. LM - NUMBER OF MINUTES.
LD - NUMBER OF DEGREES. LS - NUMBER OF SECONDS.

Subroutine: CDECLAT (Character DECLAT)

LANGUAGE: FORTRAN PROJECT: GENERAL
AUTHOR: GH LINCFILE: CDCLAT

THIS SUBROUTINE IS THE SAME AS SUBROUTINE "DECLAT" EXCEPT THE LATITUDE OR LONGITUDE IS RETURNED AS 3 VARIABLES IN "A2" FORMAT WITH LEADING ZEROES, WHICH IS IDEAL FOR PRINTING. BLANKS ARE RETURNED IF AN ILLEGAL CONVERSION IS ATTEMPTED.

Data File: HDNAMES (Well-Header File Names)

FORM: ASCII PROJECT: WELL-HEADER FILE
AUTHOR: GH LINCFILE: HNAMES

THIS DISK FILE CONTAINS THE BASE NAME FOR THE WELL-HEADER FILES, THE WELL HEADER FILE INDEX TABLE FILES, AND THE WELL HEADER LOCKING FILES. EACH NAME MUST BE 10 CHARACTERS LONG WITH THE FIRST TWO CHARACTERS OF EACH NAME FILLED WITH SPACES. THERE ARE 6 NAMES.

SECTION 6

INSTRUCTIONS FOR IMPLEMENTING A USER-WRITTEN OPTION IN THE REAL-TIME DISPLAY PROGRAM FOR THE WELL-HEADER FILE

by

George W. Hawkins

CONTENTS

TABLE

INTRODUCTION

This section describes how to implement a user-written option in program WHDDSP (by using program HDWRITER) that may be executed whenever the U (user) letter command is issued. To implement this option, the programmer must be at least familiar with the names and contents of the variables used within the well-header file, particularly those in labeled COMMON blocks HEAD, HEADO, and HKEYS. These are discussed in section 5, "Programmer's Reference Manual for the Well-Header File." A source listing of program WHDDSP will also be useful and is provided in table 6-1 on page 6-4.

DESCRIPTION OF PROGRAM

Program HDWRITER reads the source file of program WHDDSP (WHDDSP.FR) and allows the programmer to insert lines of FORTRAN required for the U option. A new file named WHDDSPU.FR is created which may then be compiled and loaded to build a new display program that contains the lines of FORTRAN added by the programmer. Note that the programmer's option is not actually added into program WHDDSP itself.

The entire process can be initiated by the command line interpreter (CLI) command @AUTOWDSPC. File AUTOWDSP contains the following command stream to run program HDWRITER, compile the resulting program (WHDDSPU), create a savefile, and run it:

```
HDWRITER;FORT WHDDSPU;
RLDR WHDDSPU HDNAM HDCURW HDGET HLOC STALOC STAEN HEDOPN HDCKF
JDAY DECLAT WECODE WDCODE UTIL.LB FORT.LB;
DELETE WHDDSPU.RB;WHDDSPU
```

The above command would apply as long as the programmer does not call any additional subprograms. If any additional subprograms are required, they must be added to the RLDR command line.

OPERATION

The programmer must insert the desired lines of FORTRAN when the program asks for them. The program will ask the operator for the "card" (line) source of the lines of FORTRAN to be entered; this makes it possible to insert lines from any convenient disk file or peripheral device. If any statement numbers are required, they must exceed 500 to avoid conflicts with those already in the display program. Both "tabs" and "spaces" are acceptable for positioning past column 6. When lines are inserted from the keyboard, the current line may be cancelled by typing in a "Shift-L" character, and single-character typing errors may be corrected by the "delete" or "rubout" key. However, no line can be changed or cancelled once the end of that line has been signified. The end of each line is signified in the usual manner by typing a "carriage return." When all lines have been entered, an end of file is signified from the keyboard by typing in a "Control-Z" character.

Information may be written onto the disk in the program by issuing "writes" on channel 7. For example, if the following lines were added as a user option, the local well number and the station identifier separated by two spaces would be written into a disk file for each well for which the U command was issued:

```
      WRITE (7,501) ICO, WELL, (ISTA(I), I=1,8)
501   FORMAT (1X,A1,F7.0,2X,7A2,A1)
```

The programmer need not be concerned with the creation or opening of the file on channel 7. Under no circumstances are "writes" to be issued on FORTRAN channels 1 or 2, to do so may result in destruction of the well-header file index tables or data file. Other devices may be accessed through their standard default FORTRAN channel numbers.

When the new program WHDDSPU is ready to run, the new option may be executed by issuing the command U. The first time this command is issued, the program will ask for a new disk file name. This is the disk file that will be used for all "writes" to channel 7. If there are no "writes" to channel 7, simply type in a "carriage return." The user's option will then be executed on whatever well was last retrieved. Each additional time the "U" command is issued, the user's option will also be executed.

Table 6-1. List of program WHDDSP.

```
C PROGRAM TO DISPLAY WELLS ON THE CRT FROM THE WELL HEADER FILE.
C ATTEMPTING TO WRITE (UPDATE) THE HEADER FILE USING THIS
C PROGRAM WILL CAUSE PROBLEMS.
C WELL HEADER FILE RECORD 0, CONTROL RECORD.
      COMMON/HEAD0/IRECO,ZERO,IRECOUNT,ICO,LEVEL(6),IHT(2,6),
     1    ILT(2,6),JDUM(151) ;186 WORDS.
C
      COMMON/HKEYS/NKEY,ICKEY,ITBLE,IWEL(3000),IWELS(3000),IDUM(141)
C
C WELL HEADER FILE RECORDS 1-3000, 186 WORDS.
      COMMON/HEAD/IREC,WELL,ISEQ,IRES,ICHECK,IMODYR,IMODMD,IUSE,
     1    ISTA(8),IQWSCR,RLAT,RLONG,ITOWN,ICMTY,IDRAIN,IPAREA,
     2    RSPARE,IUNIT(4),ALT,ISCRTOP,ISCRBOT,ICPR,WELLPR,ISEQPR,
     3    ICFU,WELLFU,ISEQFU,ITIME,ISPARE(15),IFILE(4,6),ISITE(34,3)
C
      DIMENSION NAME(11),INAME(11)
      ISTRT=1
      IOPN=0
      CALL HDNAM
      ILWS=0
      IUFIRST=0
      IFIRST=0
      PAUSE: CRT MUST BE PLACED IN PAGE MODE.
5     WRITE(10,4)
4     FORMAT('1YOU MUST RETRIEVE A WELL BY L.W.S. NUMBER WITH YOUR',
     1' FIRST COMMAND (EX: N7,1).')
3     WRITE(10,2)
2     FORMAT(1X,'<10>',19(/),1X,'COMMAND? <13>',Z)
      IF(ISTRT.NE.1)WRITE(10,147)
147   FORMAT(//1X,'TYPE A SPACE FOR POSSIBLE ADDITIONAL WELLS<13>'/
     11X,'<17><17><17>',9('<30>'),Z)
      IO=10
      CALL TTLN(IC)
24    FORMAT(/4(1X,'<13>'/),'<13>',5('<17>'))
      IC=IC+40K
      IF(IC.EQ.'K '.OR.IC.EQ.'N '.OR.IC.EQ.'P '.OR.IC.EQ.'G '.OR.IC.
     1EQ.'S '.OR.IC.EQ.'W ')GO TO 1
      IF(IC.EQ.'H ')GO TO 102
X     IF(IC.EQ.'X ')GO TO 30
      IF(IFIRST.EQ.0)GO TO 5
      IF(IC.EQ.'4 ')GO TO 25
      WRITE(10,24)
      IF(IC.EQ.'A '.AND.WELLFU.GT.0.)GO TO 8
      IF(IC.EQ.'D '.AND.WELLPR.GT.0.)GO TO 9
      IF(IC.EQ.'L ')GO TO 10
      IF(IC.EQ.'B ')GO TO 15
      IF(IC.EQ.'F ')GO TO 13
      IF(IC.EQ.'R ')GO TO 18
      IF(IC.EQ.'# ')GO TO 104
      IF(IC.EQ.'T ')GO TO 16
      IF(IC.EQ.'C ')GO TO 20
      IF(IC.EQ.'U ')GO TO 499
      IF(IC.EQ.'I ')GO TO 80
      IF(IC.EQ.'O ')GO TO 42
      IF(IC.EQ.'1 ')GO TO 401
      IF(IC.EQ.'2 ')GO TO 402
      IF(IC.EQ.'3 ')GO TO 403
      IF(IC.EQ.'7 ')GO TO 404
      IF(IC.EQ.'5 ')GO TO 405
      IF(IC.EQ.'6 ')GO TO 406
      IF(IC.EQ.'  '.AND.ISTRT.NE.1)GO TO 49
      GO TO 103
X30   WRITE(10,24)
X     WRITE(10,31)
X31   FORMAT(1X,'SAVEFILE TO EXECUTE (INCLUDE THE ".SV")? ',Z)
X     CALL CHARIN(NAME,J,11)
X     IF(J.LE.0)GO TO 103
X     CALL CLOSE(1,IER)
X     CALL CLOSE(2,IER)
X     CALL CLOSE(5,IER)
X     ILWS=0
```

Table 6-1. List of program WHDDSP (continued).

```
X       ICKEY=0
X       CALL SWAP(NAME,IER)
X       IFIRST=0
X       ISTRT=1
X       GO TO 5
80      IF(IOPN.EQ.1)GO TO 81
        WRITE(10,82)
82      FORMAT(/1X,'ENTER SOURCE FILE OF L.W.S. NUMBERS? ',Z)
        READ(11,83,END=87)(INAME(I),I=1,11)
83      FORMAT(11A2)
        CALL OPENRD(INAME,IER)
        IF(IER.EQ.1)GO TO 84
        TYPE 'NO SUCH FILE'
        GO TO 3
84      CALL OPEN(9,INAME,1,IER)
        IOPN=1
81      READ(9,85,END=87)IC,WELLNO,ISQ
85      FORMAT(A1,F6.0,1X,I2)
        GO TO 86
87      IOPN=0
        CALL CLOSE(9,IER)
        WRITE(10,88)
88      FORMAT(/1X,'END OF FILE')
        GO TO 3
8       WELLNO=WELLFU
        ISQ=ISEQFU
        CALL HDGET(ICFU,WELLNO,ISQ,IER)
        IF(IER.LE.0)GO TO 105
        GO TO 27
9       WELLNO=WELLPR
        ISQ=ISEQPR
        CALL HDGET(ICPR,WELLNO,ISQ,IER)
        IF(IER.LE.0)GO TO 106
        GO TO 27
25      READ(11,26,END=103)NAME
26      FORMAT(11A2)
        M=ICO
        IF(NAME(8).NE.'  ')M=NAME(8).AND.177400K+40K
49      CALL STALOC(M,NAME,ISTRT,IER)
        IF(IER.LE.0)GO TO 109
        IBLN1='  '
        IBLN2='<37>'
        GO TO 11
13      JREC=IREC+1
        GO TO 14
15      JREC=IREC-1
        GO TO 14
10      IO=12
        WRITE(10,12)
12      FORMAT(/1X,'<17><13><17>')
        IBLN1='  '
        IBLN2=IBLN1
        GO TO 11
18      WRITE(10)
        ACCEPT 'DESIRED RECORD #? ',JREC
14      IF(JREC.LT.1.OR.JREC.GT.IRECOUNT)GO TO 103
        CALL READR(2,JREC,IREC,1,IER)
        IF(JREC.NE.IREC)GO TO 107
        GO TO 11
32      CALL HDCURW(IC,WELLNO,KK,IER)
        IF(IER.LE.0)GO TO 110
        GO TO 33
1       READ(11,END=103)WELLNO,ISQ
86      IF(WELLNO.LE.0..OR.WELLNO.GT.999999..OR.ISQ.LT.0.OR.ISQ.GT.99)GO
     1TO  103
        IF(ISQ.EQ.0)GO TO 32
        CALL HDGET(IC,WELLNO,ISQ,IER)
        IF(IER.LE.0)GO TO 101
33      IFIRST=1
        ISTRT=1
```

Table 6-1. List of program WHDDSP (continued).

```
27      IBLN1='<37>'
        IBLN2='  '
11      CALL JDAY(IM1,ID1,IMODYR,IMODMD,0,I)
        IGW=IGWSCR/10
        ISCRN=(IGWSCR-10*IGW)*2816+'N '
        IGW=IGW*2816+'N '
        IY=ITIME/100
        IM=ITIME-IY*100
        IF(IY.NE.0)IY=IY+1900
        CALL DECLAT(RLAT,LATD,LATM,LATS)
        CALL DECLAT(RLONG,LONGD,LONGM,LONGS)
        RRLAT=LATD*10000.+LATM*100.+LATS
        RRLONG=LONGD*10000.+LONGM*100.+LONGS
        ICHK='Y '-ICHECK*2816
C
        WRITE(IO,6)IREC,IBLN1,ICO,WELL,ISEQ,ISPARE(3),IBLN1,ICPR,WELLPR,
     1ISEQPR,ICFU,WELLFU,ISEQFU,
     1IM,IY,IUSE,IBLN2,(ISTA(I),I=1,8),IBLN2,IGW,ITOWN,ICMTY,ISPARE(1),IPAREA,
     1IM1,ID1,IMODYR,
     2IDRAIN,ISPARE(2),RRLAT,RRLONG,(IUNIT(I),I=1,4),ALT,ISCRTOP,ISCRBOT,
     1ISCRN,ICHK,
     3((ISITE(I,J),I=1,34),J=1,3),IRES,RSPARE,(ISPARE(I),I=4,15),
     4((IFILE(I,J),I=1,2),J=1,6),((IFILE(I,J),I=3,4),J=1,6)
C
6       FORMAT(1H1,3X,'RECORD#',I5,9X,A1,'WELL ',A1,F7.0,I2,2A1/
     11X,'REPLACES WELL ',A1,F7.0,I2,17X,'REPLACED BY WELL ',
     2A1,F7.0,I2,' ON ',I2,'/',I4//
     31X,'USE  STATION IDENTIFIER  RESTON  TOWN  CMTY  SD     ',
     4'  PUMPAGE AREA  LAST UPDATE'/
     52X,A2,2X,A1,7A2,2A1,5X,A1,6X,I2,3X,I3,3X,I2,10X,I3,8X,I2,'/',I2,'/',I2//
     61X,'BASIN/F LAT   LONG',8X,'UNIT   ALTITUDE  SCR TOP  SCR BOT',
     7'  MULT SCR   CHECKED'/
     83X,I1,A1,2X,2F7.0,4X,4A2,2X,F5.1,6X,I4,5X,I4,7X,A1,9X,A1//
     91X,'TEXT: ',6X,34A2/2(12X,34A2/)/
     A1X,'IRES= ',I5,3X,'RSPARE=',E12.5,2X,'ISPARES= ',19X,2(2X,I5)/
     B2(43X,5(2X,I5)/),1X,'SUBFILE DATA:  WL',9X,'PU',9X,'HY',9X,'QW',9X,'LG',
     19X,'S1'/
     C1X,'LEVEL A: ',6(I4,I6,', ')/1X,'LEVEL B: ',6(I4,I6,', ')//)
C
        GO TO 3
C SUBFILE SECTION
401     IF(IFILE(2*LEVEL(1),1).EQ.0)GO TO 111
        GO TO 40
402     IF(IFILE(2*LEVEL(2),2).EQ.0)GO TO 111
        GO TO 40
403     IF(IFILE(2*LEVEL(3),3).EQ.0)GO TO 111
        GO TO 40
404     IF(IFILE(2*LEVEL(4),4).EQ.0)GO TO 111
        GO TO 40
405     IF(IFILE(2*LEVEL(5),5).EQ.0)GO TO 111
        GO TO 40
406     IF(IFILE(2*LEVEL(6),6).EQ.0)GO TO 111
        GO TO 40
40      WRITE(10,41)IC
41      FORMAT(/1X,'COMMAND "',A1,'" NOT IMPLEMENTED.')
        GO TO 3
C SAVE L.W.S NUMBERS
42      IF(ILWS.GT.0)GO TO 43
48      CALL CFILW('DSPWEL.DD',1,IER)
        IF(IER.EQ.1)GO TO 45
        WRITE(10,46)
46      FORMAT(/1X,'OUTPUT FILE "DSPWEL.DD" ALREADY EXISTS, SHOULD I'/
     15X,'1=APPEND TO IT, OR'/5X,'2=DELETE IT? ',Z)
        CALL DIGIT(IA,'1','2')
        IF(IA.EQ.'2')GO TO 47
        CALL APPEND(5,'DSPWEL.DD',2,IER)
        GO TO 43
47      CALL DFILW('DSPWEL.DD',IER)
        IF(IER.NE.1)GO TO 112
        GO TO 48
```

Table 6-1. List of program WHDDSP (continued).

```
45      CALL OPEN(5,'DSPWEL.DD',2,IER)
43      WRITE(5,44)ICO,WELL,ISEQ
44      FORMAT(1X,A1,F7.0,I2)
        ILWS=ILWS+1
        GO TO 3
C PRINT ALL WELL NUMBERS IN FILE.
20      WRITE(10,12)
        IF(NKEY.LE.0)GO TO 3
        WRITE(12,21)ICO
21      FORMAT(1H1,4X,'<10>LIST OF ALL WELLS IN COUNTY "',A1,
     1'" ON THIS DISK.'//)
        IF(ITBLE.NE.1)CALL HDGET(ICO,WELL,ISEQ,IER)
        DO 22 I=1,NKEY
        CALL WDCODE(W,L,IWEL(I),IWELS(I))
22      WRITE(12,23)I,ICO,W,L
23      FORMAT(4X,I5,' - ',A1,F7.0,I2)
        WRITE(12)
        WRITE(12,204)ICO,IRECOUNT,JDUM(1)
        GO TO 3
16      WRITE(10,12)
        DO 39 I=1,6
39      NAME(I)='@ '+LEVEL(I)*256
        WRITE(10,17)(NAME(I),I=1,6),((IHT(I,J),J=1,6),I=1,2)
17      FORMAT(/11X,'WL',3X,'PU',3X,'HY',3X,'GW',3X,'LG',3X,'S1'/
     11X,'LEVELS=',6(4X,A1)/2(1X,'TAPES= ',6I5/))
        GO TO 3
112     WRITE(10,212)
212     FORMAT(1X,'FILE WILL NOT DELETE, COMMAND ABORTED')
        GO TO 3
111     WRITE(10,211)
211     FORMAT(/1X,'NO SUBFILE DATA AVAILABLE.')
        GO TO 3
110     WRITE(10,210)IC,WELLNO
210     FORMAT(1X,'NO CURRENT WELL FOUND FOR WELL ',A1,F7.0)
        GO TO 3
109     IF(ISTRT.NE.1)WRITE(10)
        WRITE(10,209)(NAME(I),I=1,7),M
209     FORMAT(1X,'STATION IDENTIFIER 4',7A2,A2' NOT FOUND.')
        ISTRT=1
        GO TO 3
101     WRITE(10,201)IC,WELLNO,ISQ
201     FORMAT(1X,'WELL ',A1,F7.0,I2,' NOT FOUND<13>',3(/1X,'<13>'))
        GO TO 3
103     WRITE(10,203)IC
203     FORMAT(/1X,'INVALID COMMAND: COMMAND "',A1,'"')
        GO TO 3
104     WRITE(10,12)
        WRITE(10,204)ICO,IRECOUNT,JDUM(1)
204     FORMAT(/1X,'THE TOTAL # OF RECORDS IN COUNTY "',A1,'" IS',I5/
     11X,'THE MAXIMUM EVER IN THE FILE WAS',I5)
        GO TO 3
105     WRITE(10,201)ICFU,WELLFU,ISEQFU
        GO TO 3
106     WRITE(10,201)ICPR,WELLPR,ISEQPR
        GO TO 3
107     WRITE(10,207)JREC,IREC
207     FORMAT(/1X,'RETRIEVAL ERROR. RECORD',I5,' REQUESTED, RECORD',I5,
     1' RETRIEVED.')
        GO TO 3
CC!!??FLAG FOR USER OPTION AUTO PROGRAM WRITER.
499     WRITE(10,203)IC
        GO TO 3
102     WRITE(10,108)
108     FORMAT(1X,'OME',5(/))
        IF(ILWS.EQ.0)GO TO 100
        WRITE(10,114)ILWS
114     FORMAT(1X,I5,' L.W.S. NUMBERS HAVE BEEN SAVED IN FILE "DSPWEL.DD"')
100     CALL RESET
        CALL BACK
        END
```

SECTION 7

THE WELL DATA BASE SUBFILES

By

George W. Hawkins

CONTENTS

ILLUSTRATIONS

TABLE

INTRODUCTION

This section introduces the six subfiles of the well data base and describes some fields that are common to each of the subfiles. Information and instructions about these fields that are specific to each subfile are in the coding section for the appropriate subfile (sections 8 and 10). The reader should to be familiar with section 1, "Introduction to the Well Data Base," section 2, "Submittal of Data to the Well Data Base," and section 3, "Coding Instructions for Entering, Updating, and Deleting Well Information in the Well-Header File."

The well data base consists of the disk-resident well-header file (a control file of common active nontime-dependent information) and up to six tape-resident subfiles. The data in each subfile are stored by county or section of a county on magnetic tape in ascending order by L.W.S. number; the water-level and hydrogeology subfiles are stored on Linctape, and the pumpage and quality-of-water subfiles are stored on 9-track tape. The tape type was assigned according to the amount of information to be stored and the amount of activity of the subfile. The well log and spare file have not been assigned.

Each card submitted to a subfile must contain the subfile code in column 79. This identifies the subfile to which the card applies. The subfile code for each subfile is listed below:

Subfile	Subfile code
Water Level	W
Pumpage	P
Hydrogeology	H
Quality of Water	Q
Well Log	L
Spare 1	S

The subfiles must accommodate the following information:

a) Remainder of the common information for which disk space is not available in the well-header file;

b) Header and text information specific to the type of data in each subfile; and

c) Specific type of time-dependent data recorded about the well. A date is always associated with time-dependent data. Examples include a water-level measurement, the amount of pumping for a year, a hydrogeologic pumping test, a water-quality analysis, and a digitized well log.

In general, each subfile contains some specific header and text information (b), and specific time-dependent data (c), but needs, without duplication, common information described in (a) and in the well-header file.

A close look at the information in the hydrogeology subfile reveals that most of the information is needed by the other subfiles and could not be stored in the well-header file. The hydrogeology subfile is an exception in that it contains not only hydrogeologic and time-dependent information, but the rest of the common information about the well. This means that the well-header file and hydrogeology subfile together allow almost all of the nontime-dependent data about a well to be stored without duplication. The information in these two files is available to all other subfiles. Each other subfile needs only to contain a brief header specific to the subfile (such as frequency of measurement), text information, physical records available, and time-dependent data collected at the site.

SUBFILE POINTERS IN THE WELL-HEADER FILE

Each subfile of the well data base is updated by a merge program that reads the current set of Linctape or 9-track tape files, merges new data from disk, and creates a new set of tape files. The position on tape of each well in both sets of tape files is stored in the well-header file. These positions are called pointers, and they allow rapid random retrieval of well data.

Each subfile's level-control variable (in record zero in each county of the well-header file) indicates which set of tape files (or level) is the most current. Each subfile has two levels, numbered 1 and 2, which may be correspondingly labeled A and B. The level is alternated after each merge to contain the current level number. The subfile retrieval programs will retrieve data only from the current level; however, the previous set of tape files and well-header file pointers provide a backup.

SUBFILE DATA NAMES

It is necessary for the subfile programs to be able to uniquely generate Linctape or 9-track tape names for referencing data stored on tape. Users that will not be operating subfile retrieval/application programs need not read about subfile data names. As many as 26 tape data-file names may be contained in each of the two levels in the six subfiles in the six possible counties. Although as many as 31 file names may be contained on one Linctape, normally only one file name will be on each tape; this minimizes the number of file names required and insures that the maximum amount of data is stored on each Linctape.

Each tape file name will consist of 6 characters, as follows:

Character 1 = first letter of county

Character 2 = L if on Linctape, M if on 9-track tape.

Characters 3 and 4 correspond to the subfile abbreviation as shown below:

Subfile number	Subfile name	Subfile abbreviation
1	Water-Level Subfile	WL
2	Pumpage Subfile	PU
3	Hydrogeology Subfile	HY
4	Quality of Water Subfile	QW
5	Well-Log Subfile	LG
6	Spare 1	S1

Character 5 = A if subfile is at level 1, and B if at level 2.

Character 6 = Nth letter of the alphabet where N is tape file number from 1 to 26.

For example, the fourth Linctape file name in level 2 for the pumpage subfile in Nassau County is NHPUBD.

UNIVERSAL SUBFILE CARDS

Physical-Records-Available Card

Description and Purpose

The Physical Records Available card (fig. 7-1) is a universal card used in all subfiles of the well data base. The one-letter subfile code is coded in column 79 and determines the subfile to which the coded information will apply. The card type is always 1 (column 80).

This card has two main purposes--to allow the years for which physical records are available to be coded for processing by computer and to enter or delete a well in one subfile of the well data base. (A well must be entered into a subfile before data can be stored in the subfile.) The specific type of physical records to which this card applies is discussed in the coding instructions for the appropriate subfile (sections 8 and 10).

Coding

The type of processing desired is selected by the transaction code in column 78.

Transaction code A.--When the transaction code is A, the well whose L.W.S. number is coded in columns 1-10 is entered into the desired subfile, and the coded physical records available (if any) are stored. The well must not already be in the specified subfile but must be in the well-header file.

Transaction code M.--When the transaction code is M, the physical records available coded on the card are used to replace those (if any) already stored for the specified well. The well must already be in the specified subfile and well-header file.

Transaction code D.--When the transaction code is D, the entire desired well is deleted from the specified subfile. The well must already be in the specified subfile and well-header file, and the coded physical records available (if any) are simply ignored. Note that to remove only the information on physical records available from a subfile, a card with no coded physical records available with transaction code M would be submitted. Be careful not to confuse M with D, which would delete all of the data for the well in one subfile!

A coding form for the physical-records-available card is shown in figure 7-2.

The physical records available are coded in four box groups. Up to 16 groups (years) may be coded. A hydrologic-record symbol (hyphen, comma, or blank) that appears before each year indicates whether the hydrologic record from the previous group is continuous (-) or broken (,). Also, there is a century-adjust symbol (+, -, or blank) before each year that indicates the century associated with each two-digit year coded. The number 1900 is normally added to each two-digit year, but a minus sign changes it to 1800 and a plus sign turns it to 2000. In addition, this card contains fields for the two-digit year. Thus, this card can acccommodate the years from 1800 through 2099. The years 1800, 1900, and 2000 must be coded as "00" since blank year fields are normally treated as unused leftover boxes.

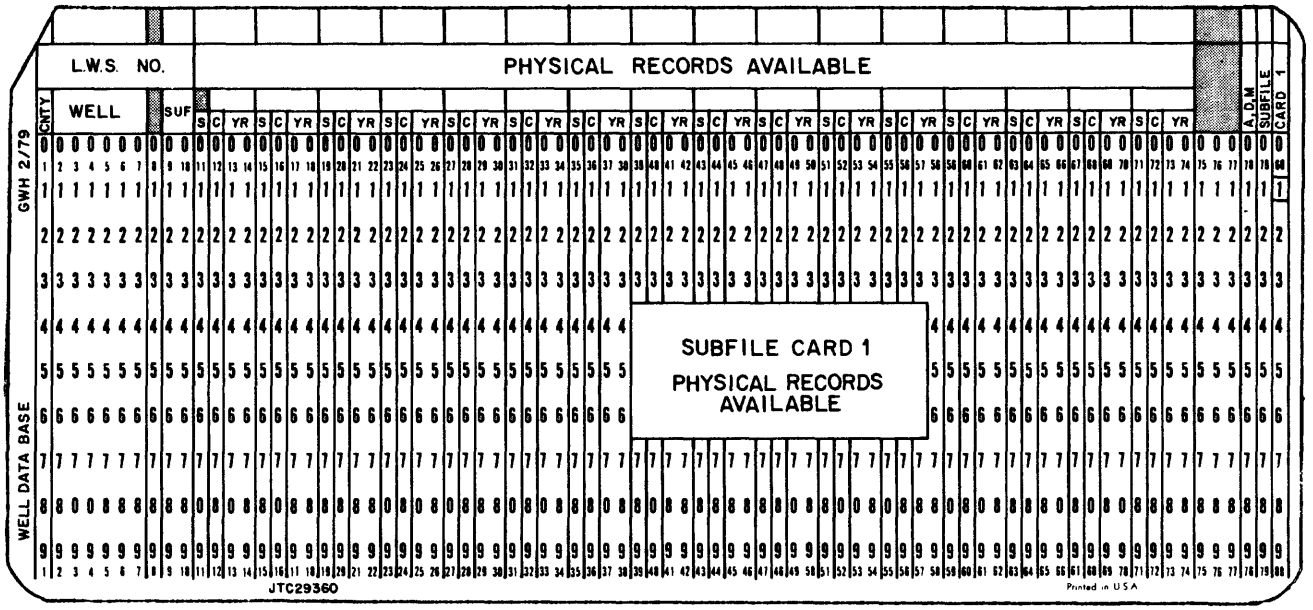


Figure 7-1. Example of physical-records-available card.

The physical-records-available card is coded as shown in part A of table 7-1.

It is important not to confuse the columns for coding the hydrologic-record symbol with the century-adjust symbol since the hyphen is used in both fields. If the last coded year is followed by a hyphen, the output programs will automatically fill in the next year with the current year. This provides a method of keeping the physical-records-available field current without updating them manually each year unless the hydrologic record is broken or terminated.

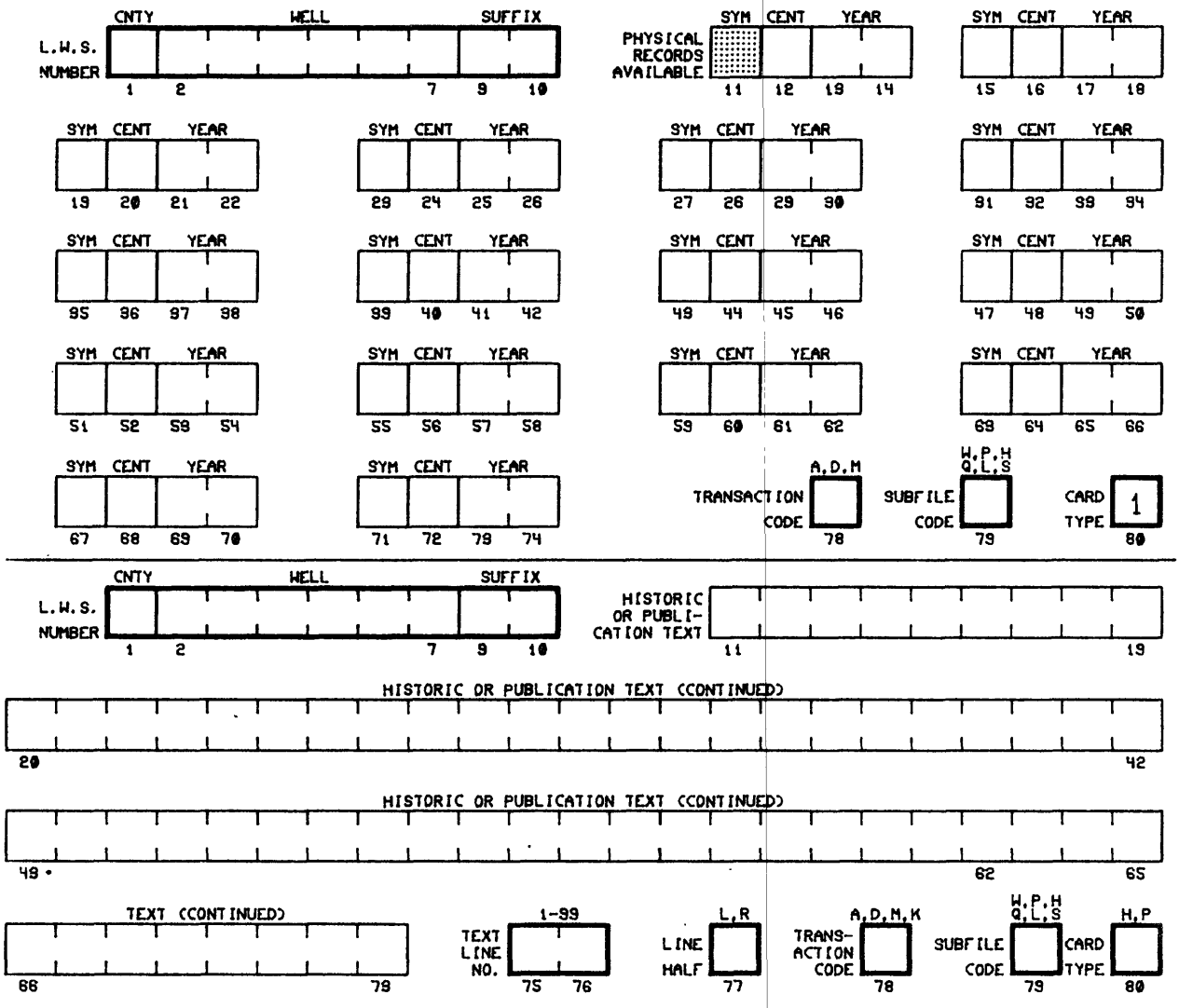


Figure 7-2.--Coding form for physical-records-available and historic or publication text cards.

Table 7-1.--Instructions for coding the physical-records-available card and subfile text cards.

A. PHYSICAL-RECORDS-AVAILABLE CARD

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11-14	Group one (subdivided below.)
11	Hydrologic record symbol (hyphen, comma, or blank). First symbol is usually left blank since there is no previous year for hydrologic record.
12	Century adjust (+, -, or blank) for first year.
13-14	First two-digit year.
15-18	Group 2.
19-22	Group 3.
23-26	Group 4.
27-30	Group 5.
31-34	Group 6.
35-38	Group 7.
39-42	Group 8.
43-46	Group 9.
47-50	Group 10.
51-54	Group 11.
55-58	Group 12.
59-62	Group 13.
63-66	Group 14.
67-70	Group 15.
71-74	Group 16.
75-77	Blank.
78	Transaction code (A, D, or M).--This field must be coded.
79	Subfile Code (W, P, H, Q, L, or S).--This field must be coded.
80	Card type (always 1).--This field must be coded.

B. SUBFILE TEXT CARDS

1-10	L.W.S. number.--This field must be coded.
11-73	Up to 63 characters of text.
74	Blank.
75-76	Output text line number (1-99).--This field must be coded.
77	Line half indicator: L = left half, R = right half.--This field must be coded.
78	Transaction code (A, D, M, K).--This field must be coded.
79	Subfile code (W, P, H, Q, L, or S).--This field must be coded.
80	Type of text card.--This field must be coded. H = historic, P = publication.

Subfile Text Cards

Description and Purpose

The historic text card or publication subfile text card (fig. 7-3) is a universal card used in all subfiles of the well data base. The one-letter subfile code is coded in column 79 and determines the subfile to which the coded information will apply. The card type is always either H or P (column 80).

Each subfile of the well data base contains a provision for storing text information about the data for each well. Unlike the general text about the well in the well-header file, the subfile text is specific as to the types of data that are stored in one subfile. Two kinds of text are available--historic text and publication text. The historic text enables the user to write or note anything desired about the information stored in a subfile for a particular well, and the publication text facilitates direct computer production of tables, avoiding the need to type the headings manually and then splice them onto the computer printouts. Each type of text may contain up to 99 lines of 126 characters per well per subfile, but one must first read any instructions specific to the publication text in each subfile. The use of both historic and publication text is optional. The text may consist of any printable characters including lowercase alphabet. Instructions for coding subfile text cards are shown in part B of table 7-1. Historic and publication text are both coded in the same way. The card type in column 80 determines the type of text that the card will contain.

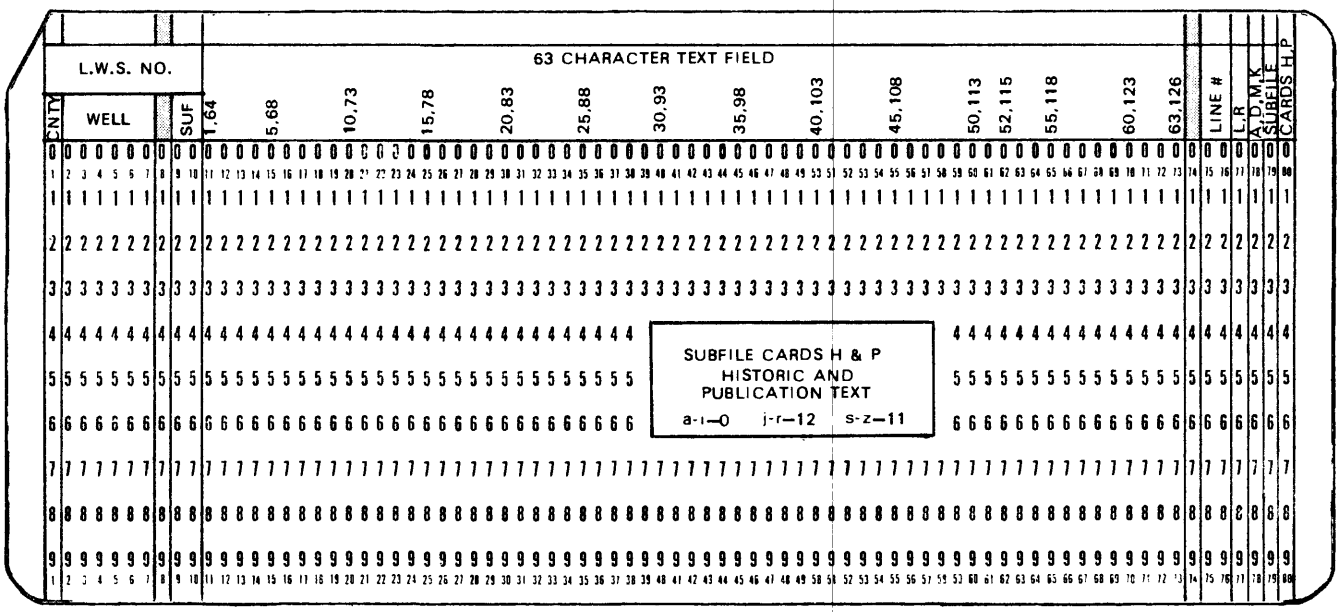


Figure 7-3.--*Example of historic text card or publication text card.*

It should be clear that if 63 characters are allowed on one card, and if the line of text to be printed exceeds 63 characters, it will take two cards to contain a full line of text. The output line number is a relative line number for editing/coding purposes and does not control the absolute line number upon which a line of text will be printed. For example, for a text line to print on absolute line 5, there must be 4 preceding lines of text. The line half indicator indicates which half of the output line is on the card. The text may occupy the left half (output columns 1-63) or the right half (output columns 64-126) of the output line. Words may be broken at the end of the first card (left half) if necessary and continued onto the second card. It is not necessary to input both a left and a right half of each line if only one of the halves will be used. However, a blank half (preferably the left half) of a line must be coded to skip a line on output.

Text lines may be entered, modified (replaced), or deleted by the appropriate transaction code in column 78. Before modifying the text, it is necessary to obtain a current printout of the text for the well to see what is on each line. It is the relative line number from a current printout which must be coded to change the text. If lines are added or deleted, the relative line numbers of all or some of the lines may change at the conclusion of the updating/merging of the subfile.

Adding a line.--A new line of text may be added through the A transaction code. The left or right half indicator determines in which half of the new line the characters on the card will be placed; the other half of the new line can be filled in by modifying the opposite half of the newly added line. Do not try to ADD both halves. Code the new output line number in columns 75-76. Note that it is not possible at present to insert a new line between existing lines, although the need is recognized. A line can be added only if no line with the specified number already exists. For example, if there are 10 lines of text, any line above 10 may be added and will become line 11 after the merge. It is best to simply increment each new line by one.

Changing a line.--One half of an existing line may be changed (replaced) through the M transaction code. This includes adding the other half of a new line of text, adding an old half line that was previously blank, or deleting (blanking out) a half line of text.

Deleting one line.--A line may be deleted (both halves) through the D transaction code. The half indicator in this case may be either L or R, but is not significant.

Deleting a group of lines.--The special transaction K (kill) is used to delete all lines of one type of text beginning at (and including) the specified line number. The half indicator is again not significant but must be L or R. This transaction should be used with caution.

The user need not compensate for line-number changes caused by additions or deletions during a single merge. However, the line numbers may be different after the next merge since they are all assigned new line numbers after updating has occurred.

A coding form for the historic and publication text cards is shown in figure 7-2.

SECTION 8

CODING INSTRUCTIONS FOR ENTERING, UPDATING, AND DELETING WELL INFORMATION IN THE WATER-LEVEL SUBFILE OF THE WELL DATA BASE

By

George W. Hawkins

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ILLUSTRATIONS

TABLES

INTRODUCTION

This section describes the coding procedures for entering, updating, and deleting information in the ground-water level subfile of the well data base. It makes frequent reference to section 7, "The Well Data Base Subfiles," which describes the subfiles in general and contains coding instructions for the two cards that are used in all subfiles. Those instructions are not repeated here, but specific comments are added.

The water-level subfile, which is stored on Linctape, is used to store well data pertaining to ground water. Other types of nontime-dependent site data are stored in either the well-header file or the hydrogeology subfile, which are available to the water-level subfile when necessary.

The subfile code for the water-level file, which must be entered on each card in column 79, is W.

CARD TYPES

Five types of cards may be input to the water-level subfile for processing. They are the physical-records-available card, one heading card, historic text card, publication text-card, and water-level card. These are described in table 8-1; two not shown in section 7 are illustrated in figure 8-1. Table 8-6 (at end of this section) lists the error checks performed on the fields on cards 2 and 3. Nontransparent and transparent data fields in the water-level subfile are grouped in table 8-2; coding forms are shown in figures 7-2 and 8-2.

TRANSACTION CODES

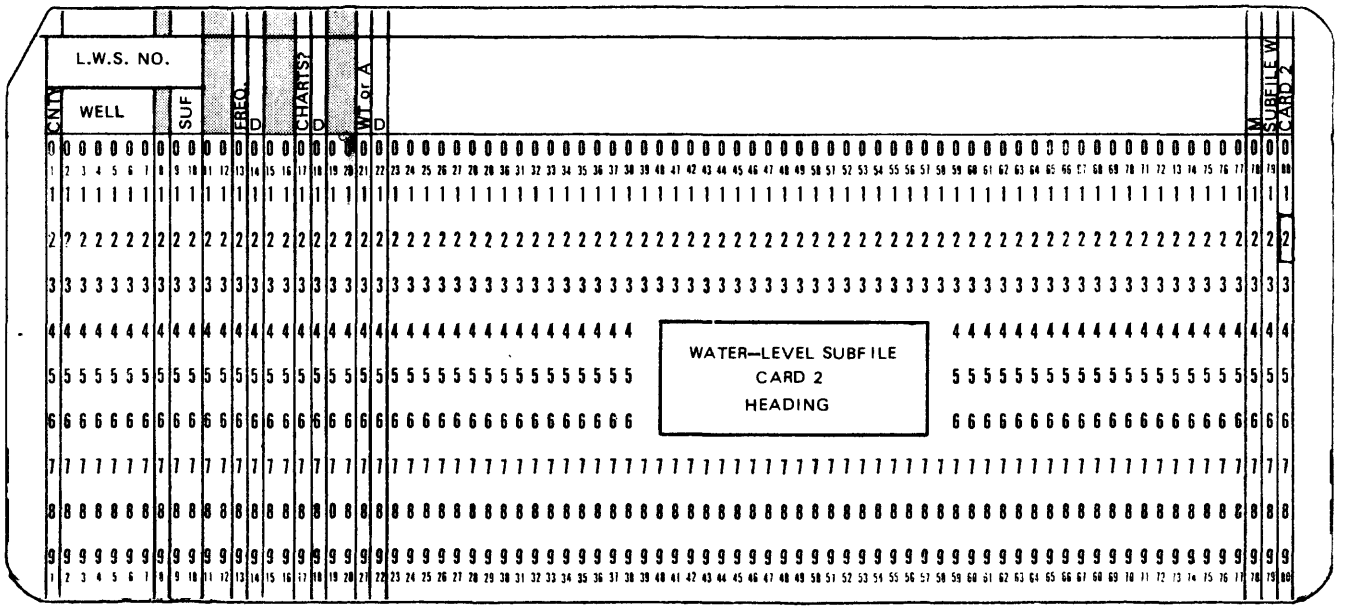
Four transaction codes may be input to the water-level subfile for processing, as described in table 8-3.

FILE ORGANIZATION

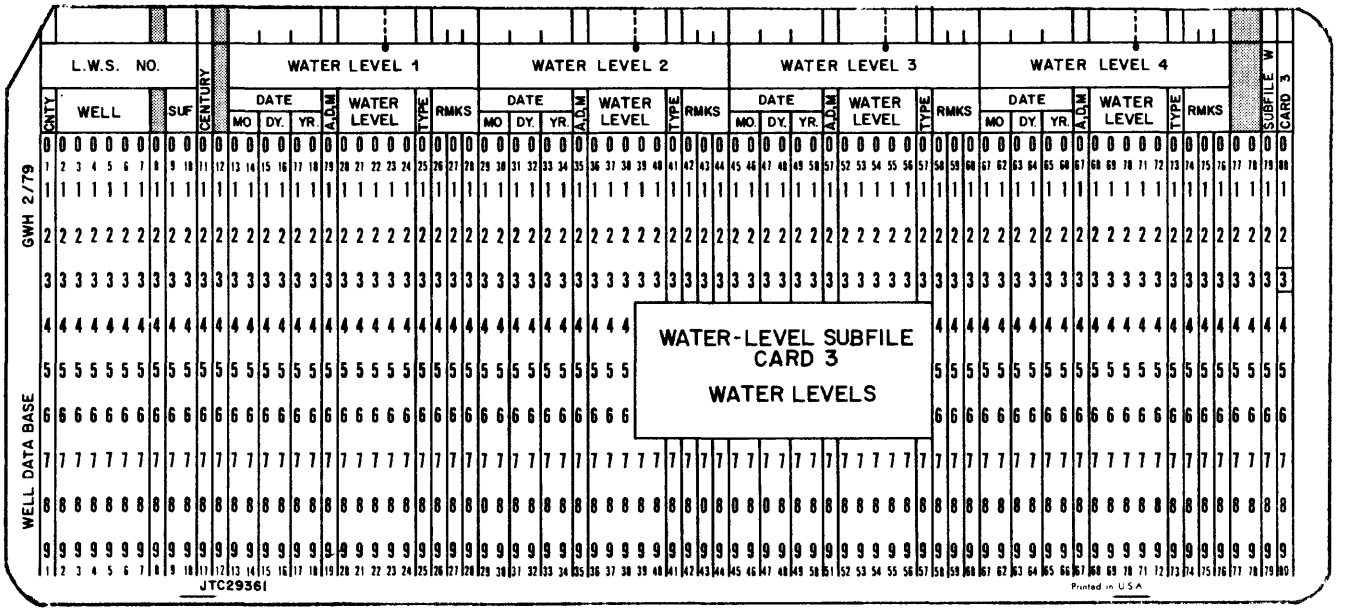
Well data in the water-level subfile are stored by county or section of a county. In most cases, several Linctapes will be needed to contain all well data for one county. Well data are stored on tape in ascending order by L.W.S. number to facilitate a standard sequential merge for updating purposes. (Note that this order may differ from the chronologic order within local well numbers, by which the data in the well-header file are stored.) The data are accessed through pointers stored in the well-header file that are created during a subfile merge.

Table 8-1.--Information on cards for input to water-level subfile.

Card	Contents
1 (fig. 7-1)	a) L.W.S. number b) physical records available c) transaction code d) subfile code e) card type
2 (fig. 8-1A)	a) L.W.S. number b) frequency of water-level measurement c) recorder-charts-available indicator d) water-table or artesian flag e) transaction code f) subfile code g) card type
H & P (fig. 7-3)	These cards are identical and contain a) L.W.S. number b) one half of one line of either historic (H) or publication (P) text c) text line number d) text line half indicator e) transaction code f) subfile code g) card type
3 (fig. 8-1B)	a) L.W.S. number b) century adjust flag c) space for up to four water-level measurements: 1) month 2) day 3) year 4) transaction code 5) water level 6) type of measurement 7) up to 3 remarks d) subfile code e) card type



A



B

Figure 8-1.--Example of water-level subfile cards. A, heading card; B, water-level card.

Table 8-2.--Nontransparent and transparent data fields in the water-level subfile.

A. Nontransparent Data Fields

- L.W.S. number
- Physical records available
- Frequency of water-level measurement
- Recorder-charts-available indicator
- Water-table or artesian flag
- Historic text
- Publication text
- Water-level measurements:
  1) Date
  2) Water level
  3) Type of water-level measurement
  4) Water-level remarks

B. Transparent Data Fields

- County
- Subfile
- Level
- Tape number
- Tape-creation year
- Tape-creation day in year
- Cycle number
- 40 words of operator text
- 3 levels of pointers
- Record-type flags

Table 8-3 --Transaction codes that may be input to water-level file.

Code	Meaning
A	Add a well, line of text, or water-level measurement.
M	Modify the physical records available, heading data, line of text, or water-level measurement.
D	Delete a well, line of text, or water-level measurement.
K	Kill (delete) some or all of one kind of text.

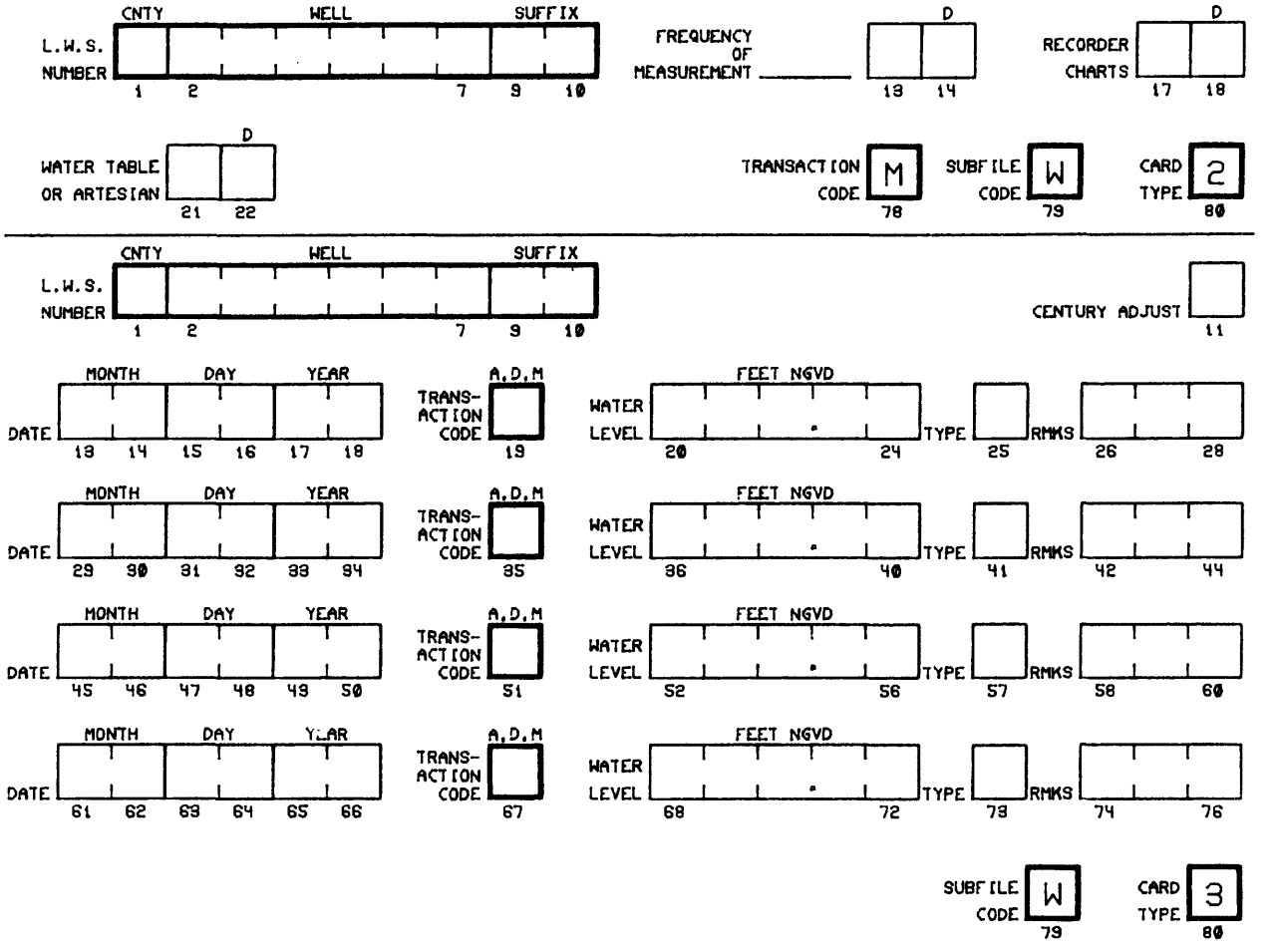


Figure 8-2.--Coding form for water-level subfile cards 2 and 3.

INSTRUCTIONS FOR CODING THE PHYSICAL-RECORDS-AVAILABLE CARD

Adding a New Well

A new well (as well as the physical records available) may be entered into the water-level subfile by submitting to program WDBINPUT a 1 card with the transaction code A as described in section 7, "The Well Data Base Subfiles." Note that the physical records available apply to the years for which water levels are available, and that the well must already be represented in the well-header file.

Deleting a Well

A well's record may be deleted by submitting a 1 card with the transaction code D to WDBINPUT. Note that everything stored for that well in the water-level subfile will disappear.

Modifying the Physical Records Available

The physical records available for a well on file may be modified by submitting a 1 card with the transaction code M to WDBINPUT.

WATER-LEVEL SUBFILE CARD TYPE 2

This card contains the nontime-dependent data (heading data) for the water-level subfile. The transaction code must always be M on this card (do not use A even if the data are being entered for the first time). Blank fields are ignored, and the standard deletion box appears after each field to allow removal of the information in each field by coding a D.

The card is coded as shown in table 8-4.

WATER-LEVEL SUBFILE CARDS H AND P (TEXT)

Both historic and publication text for a well may be stored in the water-level subfile; the coding procedure is described in section 7, "The Well Data Base Subfiles."

The length of a line of publication text should not exceed 115 characters (not 126) because only this many will be printed above the water levels for a water year in the Geological Survey's annual water-data report (U.S. Geological Survey, 1980), which is the primary purpose of publication text in the water-level subfile (fig. 8-3). The 115th text column corresponds to card column 62 on the right half of a text line.

Table 8-4.--Instructions for coding the water-level subfile card type 2.

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11-12	Blank.
13	Frequency of water-level measurement. Code: A = annually; C = continuously; D = daily; I = intermittently; M = monthly; Q = quarterly; S = semiannually; W = weekly
14	Deletion box for frequency of water-level measurement.
15-16	Blank.
17	Recorder-charts-available indicator. Code numeric 0 or leave blank for NO; Code numeric 1 for YES.
18	Deletion box for recorder-charts-available indicator.
19-20	Blank.
21	Water-table or artesian flag. Code: W = water table; A = artesian; F = flowing artesian If unknown, leave blank
22	Deletion box for water-table or artesian flag.
23-77	Blank.
78	Transaction code (always M).--This field must be coded.
79	Subfile Code (always W).--This field must be coded.
80	Card type (always 2). This field must be coded.

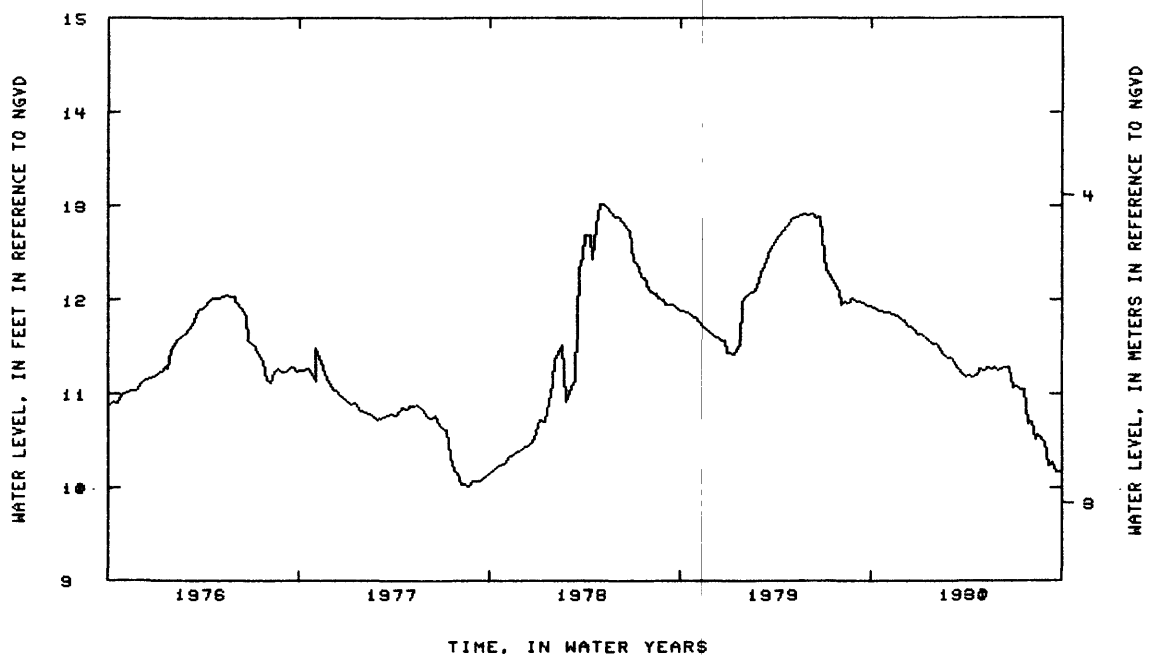
GROUND-WATER LEVELS

SUFFOLK COUNTY

405743072425701. Local number, S 4271.
LOCATION.--Lat 40°57'43", long 72°42'57", Hydrologic Unit 02030202, at Long Island Research Farm, Sound Avenue, Riverhead. Owner: U.S. Geological Survey.
AQUIFER.--Upper Glacial.
WELL CHARACTERISTICS.-Drilled observation water-table well, diameter 4 in (0.10 m), depth 105 ft (32 m), screened 100 to 105 ft (30 to 32 m).
DATUM.--Land-surface datum is 100.3 ft (30.6 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of coupling, 1.14 ft (0.35 m) above land-surface datum.
PERIOD OF RECORD.--August 1945 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.07 ft (3.98 m) NGVD, July 23, 30, 1973; lowest measured, 8.16 ft (2.49 m) NGVD, Sept. 5, 1966.

WATER LEVEL, IN FEET IN REFERENCE TO NGVD, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 8	11.92 G	DEC 9	11.74 G	FEB 11	11.46 G	APR 13	11.19 G	JUN 16	11.29 G	AUG 11	10.52 G
14	11.89 G	17	11.71 G	18	11.42 G	21	11.20 G	22	11.28 G	17	10.56 G
22	11.88 G	23	11.68 G	25	11.38 G	27	11.26 G	30	11.06 G	25	10.50 G
28	11.86 G	31	11.64 G	MAR 2	11.39 G	MAY 5	11.25 G	JUL 6	11.08 G	31	10.49 G
NOV 5	11.87 G	JAN 6	11.63 G	10	11.31 G	11	11.28 G	14	11.05 G	SEP 8	10.24 G
11	11.85 G	14	11.60 G	16	11.26 G	19	11.26 G	20	11.05 G	14	10.27 G
19	11.84 G	20	11.57 G	24	11.22 G	25	11.29 G	28	10.68 G	21	10.16 G
27	11.80 G	28	11.54 G	30	11.19 G	JUN 2	11.25 G	AUG 6	10.70 G	28	10.17 G
DEC 3	11.78 G	FEB 3	11.54 G	APR 7	11.20 G	8	11.26 G				



G MEASUREMENT BY ANOTHER AGENCY

Figure 8-3.--Typical water-level page from annual data report.

WATER-LEVEL SUBFILE CARD 3

(Water-Level Measurements)

Individual water-level measurements may be stored in the water-level subfile. Each measurement consists of a date, water level, type of measurement, and up to three remarks about the measurement or the site at the time of measurement. At present, only one measurement per day may be stored in the file for a given well.

The water-level measurement card is coded as shown in table 8-5. The transaction code that usually appears on a card only once now appears once for each measurement on this card.

REFERENCE CITED

U.S. Geological Survey, Water resources data for New York, volume 2--Long Island: U.S. Geological Survey Water-Data report (issued annually).

Table 8-5.--Instructions for coding the water-level subfile card type 3.

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11	Century-adjust symbol. If blank, 1900 is added to each two-digit year on the card. Code + to add 2000, and - to add 1800.
12	Blank.
13-14 29-30 45-46 61-62	Month of water-level measurement (right justified).
15-16 31-32 47-48 63-64	Day of water-level measurement (right justified).
17-18 33-34 49-50 65-66	Year of water-level measurement (right justified).

Date must always be complete!

19 35 51 67	Transaction code for water-level measurement.--This field must be coded. Code: A = add new measurement M = modify existing measurement D = delete existing measurement When deleting a measurement, code only the date. When modifying a measurement, the date determines which measurement will be modified. The water-level, type, and remarks must be recoded. The date itself cannot be modified. A wrong date must be deleted and reentered.
20-24 36-40 52-56 68-72	Water level, in feet above NGVD (right justified).--The program assumes two decimal places. For example, 5783 would represent 57.83 feet above NGVD. Code 99999 if the well was flowing.

Water levels lower than -99.99 cannot be coded on a card without the loss of significant figures; however, they do not occur frequently. When it is necessary to enter or change a water level of this type, submit the information to the computer section, which can enter the water-level information by editing the output from the water-level input/edit program. (This is done by replacing the decimal point in the measurement by another significant digit).

Table 8-5.--Instructions for coding the water-level subfile card type 3.--continued

Column	Contents/instructions
25 41 57 73	Type of water-level measurement. Code: A = measured, accurate to within 1 foot B = measured, less accurate than 1 foot C = airline measurement D = from driller's log E = from electric or other borehole log F = estimated G = reported H = pressure gage
26-28 42-44 58-60 74-76	Water-level remarks for water-level measurement.--Up to three remarks may be associated with each measurement. Code: A = well being pumped B = well pumped recently C = nearby well being pumped D = nearby well pumped recently E = estimated F = dry G = measurement by another agency H = recorder measurement I = affected by atmospheric pressure J = other K = tidal L = terminated measurement M = destroyed N = replaced P = estimated data Q = dewatering in area R = measured by airline pressure U = unknown data source
77-78	Blank.
79	Subfile code (always W).--This field must be coded.
80	Card type (always 3).--This field must be coded.

Table 8-6.--Error checks performed on fields.

Data field name	Checking procedure
Frequency of water-level measurement	Must be one of the assigned codes.
Recorder-charts-available indicator	Must be 0, 1, or blank.
Water-table or artesian flag	Must be W, A, F, or blank.
Date of water-level measurement	Must be a complete valid date not exceeding the current date.
Water level	Must be between -99.98 and 400 feet, inclusively.
Type of water-level measurement	Must be one of the assigned codes.
Water-level remarks	Must be one of the assigned codes.

SECTION 9

PROGRAMMER'S REFERENCE MANUAL FOR THE WATER-LEVEL SUBFILE

By

George W. Hawkins

CONTENTS

TABLES

INTRODUCTION

This section describes the internal structure and programming methods used within the water-level subfile of the well data base. It includes the names and functions of the various files, labeled COMMON blocks and program variables. The purpose of this section is to provide a reference for FORTRAN programmers who wish to write and implement their own retrieval or application programs.

The reader is assumed to be familiar with the FORTRAN programming language, operating under Data General's Real Time Disk Operating System (RDOS) and all other pertinent sections herein that describe the programs and files of the well-header file and water-level subfile.

This section, when used in conjunction with section 11, "Programmer's Reference Manual for the Hydrogeology Subfile," will allow the programmer to create a program that retrieves from both files.

PROGRAM VARIABLES AND COMMON BLOCKS

Water-level subfile data are returned in various labeled COMMON blocks in much the same way as the data are retrieved from the well-header file. Three groups of COMMON blocks are associated with each record. Primary blocks receive the data when the tape is read and are the only blocks necessary for writing an applications program. When the file is merged, the other two groups of blocks are used. Auxiliary blocks contain the update or input data, and "write" blocks are where the data are placed by the merge program before they are written back onto tape. The various blocks and variables are described in table 9-1.

RECORD FLAGS

Eight record flags are used between the various fixed-length records in the water-level subfile. These flags indicate what type of record is next on tape and are used to control the subroutines that are reading the records from tape. A description of the flags is given in table 9-2.

All subroutines that are used to read data from tape return an error flag. If the data next on tape are the kind that the subroutine is capable of reading. the data are read and the error flag is set to the record flag of the data that were read. If the data are not the kind the subroutine can read, the error flag is set to the record flag of the next kind of data on tape.

MERGE PROCESSING OF WATER-LEVEL MEASUREMENTS

Water-level measurements are merged in a special way in the water-level subfile. During any given merge, measurements that were added are flagged as added measurements. Measurements that were modified are flagged as modified measurements, and deleted measurements are flagged as deleted. Deleted

Table 9-1 --Description of variables in water level COMMON blocks.

A. L.W.S. NUMBER BLOCKS WLLWS (PRIMARY), AWLLWS (AUXILIARY) AND BWLLWS (WRITE).

Primary	Auxiliary	Write	Contents
WELLWL	XWELLWL	YWELLWL	Numeric part of local well number.
ISUFWL	JSUFWL	KSUFWL	Suffix of L.W.S. number.

B. PHYSICAL RECORDS AVAILABLE BLOCKS WLRA (PRIMARY), AWLRA (AUXILIARY), AND BWLRA (WRITE).

IRYRWL	JRYRWL	KRYRWL	Array dimensioned to 16 to hold the four-digit physical records available years (zero filled).
IRSMWL	JRSMWL	KRSMWL	Array dimensioned to 16 to hold the physical records available symbols in A1 format to print before each year (blank filled).

C. HEADING INFORMATION BLOCKS WLHD (PRIMARY), AWLHD (AUXILIARY), AND BWLHD (WRITE).

IFREQ	JFREQ	KFREQ	Current frequency of measuring water-levels in A1 format.
IRCHART	JRCHART	KRCHART	Recorder charts available flag: 0 = no, 1 = yes.
IWA	JWA	KWA	Water-table or artesian flag in A1 format.

D. HISTORIC TEXT BLOCKS WLHTXT (PRIMARY), AWLHTXT (AUXILIARY), AND BWLHTXT (WRITE).

IHWLLINE	JHWLLINE	KHWLLINE	Text line number.
IHWLTEXT	JHWLTEXT	KHWLTEXT	Array dimensioned to 64 to hold one line of text in 31A2, A1, 31A2, A1 format.

(continued)

Table 9-1.- Description of variables in water level COMMON blocks.--continued

Primary	Auxiliary	Write	Contents
E	PUBLICATION TEXT BLOCKS WLPTXT (PRIMARY), AWLPTXT (AUXILIARY), AND BWLPTXT (WRITE).		
IPWLLINE	JPWLLINE	KPWLLINE	Text line number.
IPWLTEXT	JPWLTEXT	KPWLTEXT	Array dimensioned to 64 to hold one line of text in 31A2, A1, 31A2, A1 format. Normally only 115 columns are used.
F	SINGLE WATER-LEVEL MEASUREMENT BLOCKS WLMS (PRIMARY), AWLMS (AUXILIARY), AND BWLMS (WRITE).		
IWLYEAR	JWLYEAR	KWLYEAR	Year (four digits).
IWLJDAY	JWLJDAY	KWLJDAY	Day number within year.
WL	XWL	YWL	Water-level, in feet above NGVD.
IWLTYPE	JWLTYPE	KWLTYPE	Type of measurement, in A1 format.
ISTS	JSTS	KSTS	Array dimensioned to 3, to hold up to three remarks in A1 format.

measurements are not actually removed from the file until the next merge[1]. This makes it possible to print a report of all measurements that were affected in any way during the most recent merge (for checking), and the flag allows deleted measurements to be ignored when they should be. The programmer must not forget to do this when writing an applications program.

The next time the file is merged, water-level measurements flagged for deletion are removed, and the flags on all other measurements are cleared to indicate that they were already in the file before the merge.

Measurements are flagged by encoding the information into the date. This saves considerable space over using an additional word per measurement to store the flag. The date consists of the year (4 digits) and the relative day within that year. If both positive and negative years and days are allowed, it is possible to encode the four different changes to a water-level measurement in the date. The encoding used is as follows:

[1]If an entire well is deleted, all information about that well is removed from the file during the merge.

Table 9-2.--Description of record flags in water-level subfile.

Record flag number	Purpose
1	Indicates beginning of a new well on tape (and the end of the previous well). This flag precedes the L.W.S. number of the well (county letter is omitted) and three levels of subfile pointers.
2	Precedes the 16 four-digit physical records available years and symbols but is not actually used.
	Both record types 1 and 2 are present if the well is represented in the water-level subfile and are read by subroutine LRPRA as one record
3	Precedes heading record (frequency of measurement, recorder charts available indicator, and water-table or artesian flag). This record is always present if the well is represented in the water-level subfile and is read by subroutine LRHDWL.
4	Precedes one line of historic text (line number and text). This record is optional and may be repeated up to 99 times.
5	Precedes one line of publication text (line number and text). This record is optional and may be repeated up to 99 times.
	Records 4 and 5 are read by subroutine LRTX.
6	Precedes the first water-level measurement (if any) for a well, and also precedes the first water-level measurement on a new tape if the tape was changed in the middle of a group of measurements. This record is read by subroutine LRWL and may repeat infinitely.
-1	Indicates the end of a Linctape.
-2	Indicates the end of the last Linctape (end of file).

Status of Measurement	Encoding
Already in file	Positive year, positive day
Deleted	Negative year, negative day
Added	Positive year, negative day
Modified	Negative year, positive day

Negative dates are never returned to the applications program by subroutine LRWL, a separate flag (IM) is created by this subroutine to return the information about the measurement.

RETRIEVAL FROM WATER-LEVEL SUBFILE

Retrieval from the water-level subfile is best illustrated by a "shell" retrieval program (table 9-3). This program is simply a shell retrieval program for the well-header file with additional statements added that make it into a water-level retrieval program. (Retrieval of well information from the well-header file is explained in section 5, "Programmer's Reference Manual for the Well-Header File.")

Once the desired L.W.S. number is obtained and the well information is retrieved from the well-header file, subroutine LTAMR is called. This is a subroutine to determine whether data for that well are available in the water-level subfile and, if so, to position the Linctape to the data.

The four tape-reading subroutines can now be used. The tape L.W.S. number and physical records available must now be read by subroutine LRPRA, and the heading data must then be read by subroutine LRHDWL. Subroutine LRTX is then called to read a line (if any) of historic text until the last line is read, followed by the publication text in a similar manner. Finally, subroutine LRWL is called to read one water-level measurement (if any) from tape. (Be sure to omit deleted measurements that have IM set to -1). Note that once read, the data in the well-header file, the physical records available, and the water-level heading data will be available at any time. The historic text and publication text are available only one line at a time, and only one water-level measurement is available at a time unless the programmer stores the measurement for later use.

Tape records must be read in the order in which they appear. The only backspace possible is to the beginning of the well, and unneeded data must be read and ignored to forward space. The four tape-reading subroutines will not read the data from the tape if the type of data next on the tape are not the kind that the particular subroutine expects to read. Thus, the order shown in the "shell" program must be followed.

To create a new application program, the programmer need only copy file DWLSHELL.FR into some other appropriately named file and use the text editor to add the required statements. After the new program has been compiled from the FORT command, the new savefile must be created. The minimum CLI command needed to create a savefile using the water-level subfile shell program, assuming a program name of MAIN is:

```
RLDR MAIN RLWS HDCURW HDNAM HDGET HDCKF

     HLOC WECODE WDCODE HEDOPN LRPRA

     LRHDWL LRTX LRWL LTAMR RNLT JDAY HDLINC

     LTSYS.LB UTIL.LB FORT.LB
```

Note that the above water-level subfile software will usually be maintained only on the well data base program-development disk. Also all new programs should be thoroughly tested on the test data files on that disk before applying the program on the "live" data files on other disks. Again, in a retrieval program, no "writes" should be issued on FORTRAN channels 1 or 2.

Many of the water-level subfile software routines are described in table 9-4.

SEQUENTIAL RETRIEVAL FROM THE WATER-LEVEL SUBFILE

Well records stored on tape may be read sequentially if needed. The easiest way to begin the program is to randomly retrieve the data for the starting well. Then, at the end of that well, go back to subroutine LRPRA, which will begin to read the next well. This method does not obtain the record from the well-header file because the call to HDGET will be bypassed, but this can easily be moved if needed. If it is not moved, the L.W.S. number used for any purpose must be the one in labeled COMMON block WLLWS because data in the COMMON blocks from the header file will not change, and neither will the variables returned from subroutine RLWS. Also the programmer must terminate the program (statement 100) if subroutine LRPRA returns an error code of -2 (end of last tape), otherwise the program will go into a loop after the last well is read from tape.

Table 9-3.--List of program DWLSHELL.

```
C WATER-LEVEL SUBFILE "SHELL" RETRIEVAL PROGRAM BY L.W.S. NUMBER.
C FORTRAN CHANNELS 1, 2, AND 12 ARE IN USE BY THE WELL HEADER FILE.
C
C WELL HEADER FILE RECORD 0, CONTROL RECORD.
       COMMON/HEAD0/IREC0,ZERO,IRECOUNT,IC0,LEVEL(6),IHT(2,6),
     1    ILT(2,6),JDUM(151) ;186 WORDS.
C
C WELL HEADER KEY FILE, 24 BLOCKS LONG.
       COMMON/HKEYS/NKEY,ICKEY,ITBLE,IWEL(3000),IWELS(3000),IDUM(141)
C
C
C
C WELL HEADER FILE RECORDS 1-3000, 186 WORDS.
       COMMON/HEAD/IREC,WELL,ISEQ,IRES,ICHECK,IMODYR,IMODMD,IUSE,
     1    ISTA(8),IQWSCR,RLAT,RLONG,ITOWN,ICMTY,IDRAIN,IPAREA,
     2    RSPARE,IUNIT(4),ALT,ISCRTOP,ISCRBOT,ICPR,WELLPR,ISEQPR,
     3    ICFU,WELLFU,ISEQFU,ITIME,ISPARE(15),IFILE(4,6),ISITE(34,3)
C
C
C WELL DATA BASE SUBFILE COMMON BLOCKS.
C
C GROUND-WATER LEVEL SUBFILE PRIMARY COMMON BLOCKS.
C PHYSICAL RECORDS AVAILABLE.  YEAR, SYMBOL.
       COMMON/WLRA/IRYRWL(16),IRSMWL(16)
C L.W.S. NUMBER.  WELL, SUFFIX.
       COMMON/WLLWS/WELLWL,ISUFWL
C HEADING. FREQUENCY OF MEASUREMENT, RECORDER CHARTS AVAILABLE FLAG,
C WATER TABLE, OR ARTESIAN.
       COMMON/WLHD/IFREQ,IRCHART,IWA
C PUBLICATION TEXT.  LINE NUMBER, TEXT.
       COMMON/WLPTXT/IPWLLINE,IPWLTEXT(64)
C HISTORICAL TEXT.  LINE NUMBER, TEXT.
       COMMON/WLHTXT/IHWLLINE,IHWLTEXT(64)
C WATER-LEVELS.  YEAR (4 DIGIT), RELATIVE DAY, WATER-LEVEL, TYPE OF
C  MEASUREMENT, REMARKS.
       COMMON/WLMS/IWLYEAR,IWLJDAY,WL,IWLTYPE,ISTS(3)
C
C
C
       KOUNT=0
       CALL HDNAM
C
C USER INITIALIZATION CODE GOES HERE.
C
C MAIN RETRIEVAL LOOP.
1      CALL RLWS(IC,WELLNO,JSEQ)
       IF(WELLNO.LE.0.)GO TO 100
C GET WELL FROM HEADER FILE
       CALL HDGET(IC,WELLNO,JSEQ,IER)
       IF(IER)1,3,2
C POSITION LINCTAPE (MAYBE) TO WELL IF IT EXISTS
2      CALL LTAMR(1,IERF)
       IF(IERF.NE.1)GO TO 5
C
C READ WL PHYSICAL RECORDS AVAILABLE
       CALL LRPRA(1,WELLWL,ISUFWL,IRYRWL,IRSMWL,IERF)
       IF(IERF.EQ.1)GO TO 10
       TYPE 'ERROR AT 1, IERF=',IERF
       PAUSE
C
10     IF(WELL.EQ.WELLWL.AND.ISEQ.EQ.ISUFWL)GO TO 11
       WRITE(10,12)IC0,WELL,ISEQ,IC0,WELLWL,ISUFWL
12     FORMAT(1X,'SUBFILE RETRIEVAL ERROR; LWS FROM SUBFILE NOT EQUAL ',
     1'LWS FROM HEADER FILE.'/5X,'HEADER WELL=',A1,F7.0,I2,
     25X,'WATER-LEVEL WELL=',A1,F7.0,I2)
       PAUSE
C
C
C PHYSICAL RECORDS AVAILABLE AND LWS READ FROM TAPE ARE
C  AVAILABLE FROM THIS POINT ON (COMMON BLOCK WLLWS AND WLRA)
11     CONTINUE
```

Table 9-3.--List of program DWLSHELL.

```
C
C
C
C READ HEADING
      CALL LRHDWL(1,IERF)
      IF(IERF.NE.3)GO TO 20
C
C
C
C HEADING IS AVAILABLE FROM THIS POINT ON (COMMON BLOCK WLHD)
C
C
C
C READ HISTORICAL TEXT
20    CALL LRTX(1,'H ',1HWLLINE,1HWLTEXT,IERF)
      IF(IERF.NE.4)GO TO 35
C
C
C ONE LINE OF HISTORICAL TEXT MAY BE AVAILABLE HERE (COMMON BLOCK WLHTXT)
C
C
C
      GO TO 20
C
C READ PUBLICATION TEXT
35    CALL LRTX(1,'P ',IPWLLINE,IPWLTEXT,IERF)
      IF(IERF.NE.5)GO TO 45
C
C
C ONE LINE OF PUBLICATION TEXT MAY BE AVAILABLE HERE (COMMON BLOCK WLPTXT).
C
C
C
      GO TO 35
C
C READ A WATER-LEVEL MEASUREMENT
45    CALL LRWL(IM,IERF)
      IF(IERF.NE.6)GO TO 50
C CHECK FOR A DELETED WATER LEVEL
      IF(IM.EQ.-1)GO TO 45
      CALL JDAY(IMON,IDAY,IWLYEAR,IWLJDAY,0,LEAP)
C
C
C
C ONE WATER LEVEL MAY BE AVAILABLE HERE (COMMON BLOCK WLMS).
C
C
C
      GO TO 45
C
50    KOUNT=KOUNT+1
      GO TO 1
C WELL NOT FOUND.
3     WRITE(10,4)IC,WELLNO,JSEQ
4     FORMAT(1X,'WELL ',A1,F7.0,I2,' NOT FOUND.')
      GO TO 1
C NO WATER-LEVEL DATA
5     WRITE(10,6)IC,WELLNO,JSEQ
6     FORMAT(1X,'NO WATER-LEVEL INFORMATION ON FILE FOR WELL ',A1,F7.0,I2)
      GO TO 1
C END.
100   WRITE(10,7)KOUNT
7     FORMAT(1X,I5,' WELLS HAVE BEEN RETRIEVED AND PROCESSED.')
C
C USER END OF PROGRAM CODE GOES HERE.
C
      CALL RESET
      CALL BACK
      END
```

Table 9-4.--Water-level subfile software description.

INDEX

PROGRAM	HDSF	
PROGRAM	DWLSHELL	(WATER LEVEL SUBFILE SHELL)
SUBROUTINE.	JDAY	(JULIANIZED DATE)
SUBROUTINE	LRPRA	(READ PHYSICAL RECORDS AVAILABLE)
SUBROUTINE.	LRHDWL	(READ WL HEADING)
SUBROUTINE:	LRTX	(READ TEXT)
SUBROUTINE:	SFDATA	(SUBFILE DATA AVAILABLE)
SUBROUTINE:	LRWL	(READ A WATER LEVEL)
SUBROUTINE	LTAMR	(LINCTAPE AUTO-READ)
SUBROUTINE:	RNLT	(READ A NEW LINCTAPE)
SUBROUTINE:	HDLINC	(HEADER SUBFILE NAMES)

Table 9-4.--Water-level subfile software descriptions.

Program: HDSF

LANGUAGE: FORTRAN PROJECT WELL DATA BASE SUBFILES
AUTHORS: GH GT LINCFILE: HDSF

THIS FILE CONTAINS THE VARIOUS BLOCKS OF LABELED COMMON USED IN MANY OF THE PROGRAMS WHICH ACCESS THE SUBFILES OF THE WELL DATA BASE. THUS THIS FILE CAN BE USED TO OBTAIN THE COMMON BLOCKS WITHOUT HAVING TO TYPE THEM OR FIND A PROGRAM TO TAKE THEM FROM.

Program: DWLSHELL (Water Level Subfile Shell)

LANGUAGE: FORTRAN PROJECT: WATER-LEVEL SUBFILE
AUTHOR: GH LINCFILE: DWLSHL

THIS IS A SHELL RETRIEVAL PROGRAM FOR RETRIEVING WATER-LEVEL DATA FROM THE WATER-LEVEL SUBFILE. IT IS BASICALLY A WELL-HEADER FILE SHELL PROGRAM WITH THE NECESSARY STATEMENTS ADDED TO MAKE IT INTO A WATER-LEVEL SHELL RETRIEVAL PROGRAM.

SUBROUTINES REQUIRED: RLWS, HDCURW, HDNAM, HDGET, HDCKF, HLOC, WECODE, WDCODE, HEDOPN, LRPRA, LRHDWL, LRTX, LRWL, LTAMR, RNLT, JDAY, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB, UTIL.LB.
DISK DATA FILES REQUIRED: HDNAMES AND AT LEAST ONE COUNTY OF THE WELL-HEADER FILE.

Subroutine: JDAY (Julianized Date)

LANGUAGE: FORTRAN PROJECT: GENERAL
AUTHOR: GH LINCFILE: JDAY

THIS SUBROUTINE CALCULATES THE RELATIVE DAY NUMBER WITHIN A YEAR FROM A DATE EXPRESSED AS MONTH, DAY, AND YEAR AND CAN ALSO PERFORM THE REVERSE CONVERSION. THE YEAR MUST BE SUPPLIED SO THAT THE SUBROUTINE CAN DETERMINE WHETHER IT IS LEAP YEAR, AND THE RESULT IS RETURNED FOR USE BY THE CALLING PROGRAM. LEAP-YEAR CORRECTIONS ARE INCLUDED FOR ALL YEARS AFTER 1582. NO CHECKS ARE MADE FOR INVALID INPUT ARGUMENTS.

ARGUMENTS(IM,ID,IY,NDAY,IDIR,LEAP).
IM - CALENDAR MONTH.
ID - CALENDAR DAY.
IY - CALENDAR YEAR EXPRESSED USING 4 DIGITS.
NDAY - RELATIVE DAY NUMBER (1-365, OR 366) WITHIN "IY."
IDIR - CONVERSION DIRECTION:
0 = DECODE RELATIVE DAY NUMBER INTO MONTH AND DAY.
1 = ENCODE MONTH AND DAY INTO RELATIVE DAY NUMBER.
LEAP - LEAP YEAR INDICATOR RETURNED FROM SUBROUTINE:
0 = "IY" IS NOT A LEAP YEAR.
1 = "IY" IS A LEAP YEAR.

Table 9-4 --Water-level subfile software descriptions.--continued

Subroutine. LRPRA (Read Physical Records Available)

LANGUAGE FORTRAN — PROJECT: WELL DATA BASE SUBFILES
AUTHOR GH — LINCFILE: LRPRA

THIS SUBROUTINE READS THE PHYSICAL RECORDS AVAILABLE FROM LINCTAPE FOR THE DESIRED SUBFILE OF THE WELL DATA BASE. IT MAY BE USED AS AN OVERLAY NAMED "VLRPRA." IF THIS IS DONE, REMEMBER TO INCLUDE THE LABELED COMMON BLOCK "FLAG" IN THE MAIN PROGRAM.

ARGUMENTS(ISUBFILE,WELLX,ISUFX,IRYR,IRSM IER).
- ISUBFILE - DESIRED SUBFILE NUMBER.
- WELLX - WELL NUMBER OF WELL READ FROM TAPE.
- ISUFX - SUFFIX NUMBER OF WELL READ FROM TAPE.
- IRYR - ARRAY DIMENSIONED TO 16 IN WHICH WILL BE PLACED THE 4-DIGIT YEARS OF THE PHYSICAL RECORDS AVAILABLE.
- IRSM - ARRAY DIMENSIONED TO 16 IN WHICH WILL BE PLACED THE PHYSICAL RECORDS AVAILABLE SYMBOLS.
- IER - ERROR INDICATOR:
  - 1 = PHYSICAL RECORDS AVAILABLE WERE READ.
  - -2 = END OF ALL TAPES.
  - >0 = TYPE OF THE NEXT KIND OF DATA ON TAPE.

SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED LTSYS.LB.

Subroutine. LRHDWL (Read WL Heading)

LANGUAGE FORTRAN — PROJECT WATER-LEVEL SUBFILE
AUTHOR: GH — LINCFILE LRHDWL

THIS SUBROUTINE READS THE WATER-LEVEL-HEADING DATA FOR THE WATER-LEVEL SUBFILE OF THE WELL DATA BASE. THE INFORMATION IS RETURNED IN THE WATER-LEVEL LABELLED COMMON BLOCK "WLHD" AND MAY BE USED AS AN OVERLAY NAMED "VLRHDWL." IF THIS IS DONE, REMEMBER TO INCLUDE THE LABELED COMMON BLOCK "FLAG" IN THE MAIN PROGRAM.

ARGUMENTS(ISUBFILE,IER).
- ISUBFILE - SUBFILE NUMBER (SET THIS TO 1).
- IER - ERROR INDICATOR:
  - 3 = WATER-LEVEL HEADING WAS READ.
  - -2 = END OF LAST TAPE.
  - >0 = TYPE OF THE NEXT KIND OF DATA ON TAPE.

SUBROUTINES REQUIRED RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Table 9-4.--Water-level subfile software descriptions.--continued

Subroutine. LRTX (Read Text)

LANGUAGE: FORTRAN — PROJECT: WELL DATA BASE SUBFILES
AUTHOR: GH — LINCFILE: LRTX

THIS SUBROUTINE READS A LINE OF HISTORIC OR PUBLICATION TEXT FROM THE DESIRED SUBFILE OF THE WELL DATA BASE. IT MAY BE USED AS AN OVERLAY NAMED "VLRTX." IF THIS IS DONE, REMEMBER TO INCLUDE THE LABELED COMMON BLOCK "FLAG" IN THE MAIN PROGRAM

ARGUMENTS(ISUBFILE,ITTEXT,LINE,ITEXT,IER).
- ISUBFILE - SUBFILE NUMBER.
- ITTEXT - TYPE OF TEXT DESIRED IN "A1" FORMAT
  - "H " = HISTORIC;
  - "P " = PUBLICATION.
- LINE - LINE NUMBER OF THE LINE OF TEXT READ.
- ITEXT - ARRAY DIMENSIONED TO 64 IN WHICH WILL BE PLACED THE LINE OF TEXT READ IN "31A2,A1,31A2,A1" FORMAT.
- IER - ERROR INDICATOR:
  - 4 = A LINE OF WATER-LEVEL HISTORIC TEXT WAS READ (IF "ITTEXT" = "H ").
  - 5 = A LINE OF WATER-LEVEL PUBLICATION TEXT WAS READ (IF "ITTEXT" = "P ").
  - 9 = A LINE OF HYDROGEOLOGY HISTORIC TEXT WAS READ (IF "ITTEXT" = "H ").
  - 10 = A LINE OF HYDROGEOLOGY PUBLICATION TEXT WAS READ (IF "ITTEXT" = "P ").
  - -2 = END OF LAST TAPE.
  - >0 = TYPE OF NEXT KIND OF DATA ON TAPE.

SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Subroutine: SFDATA (Subfile Data Available)

LANGUAGE: FORTRAN — PROJECT: WELL DATA BASE SUBFILES
AUTHOR: GH — LINCFILE: SFDATA

THIS SUBROUTINE INDICATES WHETHER DATA FOR A WELL IS STORED IN THE CURRENT LEVEL OF A SUBFILE OF THE WELL DATA BASE. IT IS ASSUMED THAT THE DESIRED WELL'S RECORD HAS BEEN RETRIEVED FROM THE WELL-HEADER FILE BEFORE THIS SUBROUTINE IS CALLED.

ARGUMENTS(ISUBFILE,IDATA).
- ISUBFILE - SUBFILE TO TEST (1-6 ONLY).
- IDATA - RESULT OF TEST
  - 0 = WELL DOES NOT EXIST IN SUBFILE.
  - >0 = WELL EXISTS IN SUBFILE.

Subroutine. LRWL (Read A Water Level)

LANGUAGE: FORTRAN — PROJECT: WATER-LEVEL SUBFILE
AUTHOR. GH — LINCFILE: LRWL

THIS SUBROUTINE READS ONE WATER LEVEL MEASUREMENT FROM THE WATER-LEVEL SUBFILE OF THE WELL DATA BASE. THE INFORMATION IS RETURNED IN THE WATER LEVEL LABELED COMMON BLOCK "WLMS" AND MAY BE USED AS AN OVERLAY NAMED "VLRWL." IF THIS IS DONE, REMEMBER TO INCLUDE THE LABELED COMMON BLOCK "FLAG" IN THE MAIN PROGRAM.

ARGUMENTS(IM,IERF).
IM - MERGE INDICATOR--INDICATES WHAT HAPPENED TO THIS MEASUREMENT DURING THE MOST RECENT MERGE OF THE WATER-LEVEL SUBFILE:
-1 = MEASUREMENT WAS DELETED.
0 = NOTHING, MEASUREMENT WAS IN FILE PRIOR TO THE LAST MERGE AND WAS NOT CHANGED.
1 = MEASURLMENT WAS ADDED DURING LAST MERGE.
2 = MEASUREMENT WAS CHANGED DURING LAST MERGE.
IER - ERROR INDICATOR
6 = A WATER LEVEL MEASUREMENT WAS READ.
-2 = END OF LAST TAPE.
>0 = THE TYPE OF THE NEXT KIND OF DATA ON TAPE.
SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB, UTIL.LB.

Subroutine. LTAMR (Linctape Auto-Read)

LANGUAGE: FORTRAN — PROJECT: WELL DATA BASE SUBFILES
AUTHOR: GH — LINCFILE: LTAMR

THIS SUBROUTINE POSITIONS A LINCTAPE TO THE BEGINNING OF THE DATA FOR A WELL IN THE DESIRED SUBFILE. ALL TAPE MOUNTING MESSAGES ARE ALSO PRODUCED. IT IS ASSUMED THAT THE DESIRED WELL'S RECORD HAS ALREADY BEEN RETRIEVED FROM THE WELL-HEADER FILE.

ARGUMENTS(ISB,IERF).
ISB - DESIRED SUBFILE NUMBER.
IERF - RECORD TYPE FLAG READ FROM TAPE AFTER POSITIONING THE TAPE. A CORRECT SEARCH SHOULD RETURN A FLAG EQUAL TO 1.
SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED. LTSYS.LB.

Table 9-4.--Water-level subfile software descriptions.--continued

Subroutine: RNLT (Read a New Linctape)

LANGUAGE: FORTRAN — PROJECT: WELL DATA BASE SUBFILES
AUTHOR: GH — LINCFILE: RNLT

THIS SUBROUTINE HANDLES TAPE CHANGES WHILE READING, AND READS THE FIRST BLOCK FROM THE TAPE, WHICH IS THE INTERNAL TAPE IDENTIFICATION. EITHER A SPECIFIC TAPE NUMBER MAY BE REQUESTED, OR THE NEXT TAPE IN SEQUENCE MAY BE REQUESTED. SEVERAL ITEMS MUST BE PROVIDED IN LABELED COMMON (COUNTY, SUBFILE, LEVEL, TAPE)

ARGUMENTS(NTAPE).
NTAPE - TAPE NUMBER DESIRED. IF SET TO ZERO, THE NEXT TAPE IN SEQUENCE WILL BE USED.
SUBROUTINES REQUIRED: HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Subroutine: HDLINC (Header Subfile Names)

LANGUAGE: FORTRAN — PROJECT: WELL DATA BASE SUBFILES
AUTHOR: GH — LINCFILE: HDLINC

THIS SUBROUTINE GENERATES A 6-CHARACTER FILE NAME FOR USE IN REFERENCING THE SUBFILES OF THE WELL DATA BASE. THE SUBFILES ARE STORED ON EITHER LINCTAPE OR 9-TRACK MAGNETIC TAPE. UP TO 3744 NAMES MAY BE GENERATED. (6 COUNTIES X 2 TAPE TYPES X 6 SUBFILES X 2 LEVELS X 26 TAPES).

ARGUMENTS(IC,IFILE,LEVEL,ITAPE,IDTYPE,NAME).
IC - COUNTY LETTER IN "A1" FORMAT (K, N, P, Q, S, OR W).
IFILE - SUBFILE (1-6).
LEVEL - LEVEL (1-2)
ITAPE - TAPE NUMBER (1-26).
IDTYPE- MAGNETIC TAPE DRIVE TYPE:
0 = LINCTAPE
1 = 9-TRACK TAPE.
NAME - ARRAY DIMENSIONED TO 3 WHICH WILL CONTAIN THE GENERATED NAME IN "A2" FORMAT. IF "NAME" IS REPRESENTED BY 123456, CHARACTER POSITIONS ARE FILLED AS FOLLOWS
1 = COUNTY LETTER.
2 = "L" FOR LINCTAPE, OR "M" FOR 9-TRACK TAPE.
3 & 4 = SUBFILE NAME ("WL", "PU", "HY", "QW", "LG", OR "S1").
5 = LEVEL (1=A, 2=B).
6 = TAPE NUMBER (1=A, 2=B, ETC. THROUGH THE ALPHABET).
"NAME" WILL CONTAIN "??????" IF AN INVALID COUNTY OR SUBFILE IS DETECTED. NO OTHER VALIDITY CHECKS ARE MADE.

SECTION 10

CODING INSTRUCTIONS FOR ENTERING, UPDATING, AND DELETING WELL INFORMATION IN THE HYDROGEOLOGY SUBFILE OF THE WELL DATA BASE

By

George W. Hawkins

and

Gregory M. Terlecki

CONTENTS

ILLUSTRATIONS

TABLES

* Not available in 1982

INTRODUCTION

This section describes the coding procedures for entering, updating, and deleting information in the hydrogeology subfile of the well data base. It makes frequent reference to section 7, "The Well Data Base Subfiles," which describes the subfiles in general and contains coding instructions for the two cards that are used in all subfiles. Those instructions are not repeated here, but specific comments are added.

The hydrogeology subfile, which is stored on Linctape, contains hydrogeologic information, pumping-test data, and nontime-dependent information about the well not contained in the well-header file.

The subfile code for the hydrogeology file, which must be entered on each card in column 79, is H.

CARD TYPES

Nine types of cards may be input to the hydrogeology subfile for processing. They are:

physical records available card,

four heading cards,

depth to top of hydrogeologic units card,

historic text card,

publication text card,

pumping-test card.

These cards are described in table 10-1; the six not shown in section 7 are illustrated in figure 10-1. Nontransparent and transparent data fields in the hydrogeology subfile are grouped in table 10-2; coding forms are shown in figures 10-2 and 10-3.

Table 10-1.--Information on cards for input to hydrogeology subfile.

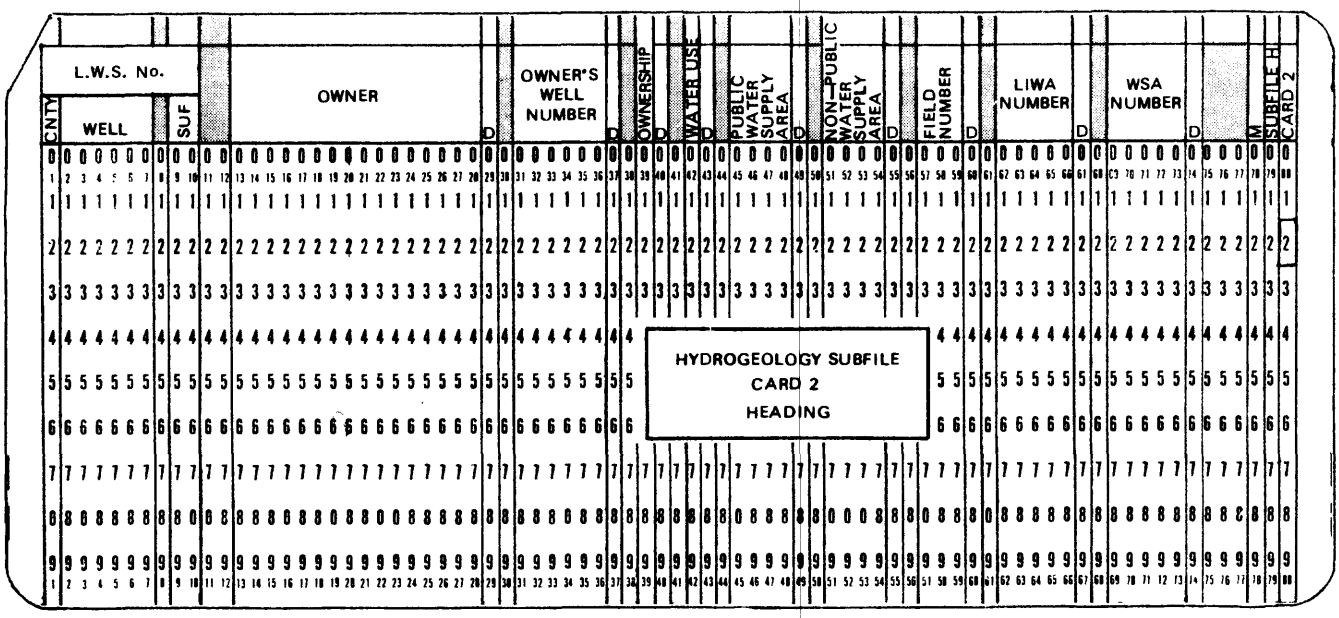
Card	Contents	
1 (fig. 7-1)	a) L.W.S. number	d) subfile code
	b) physical records available	e) card type
	c) transaction code	

Table 10-1.--Information on cards for input to hydrogeology subfile (continued).

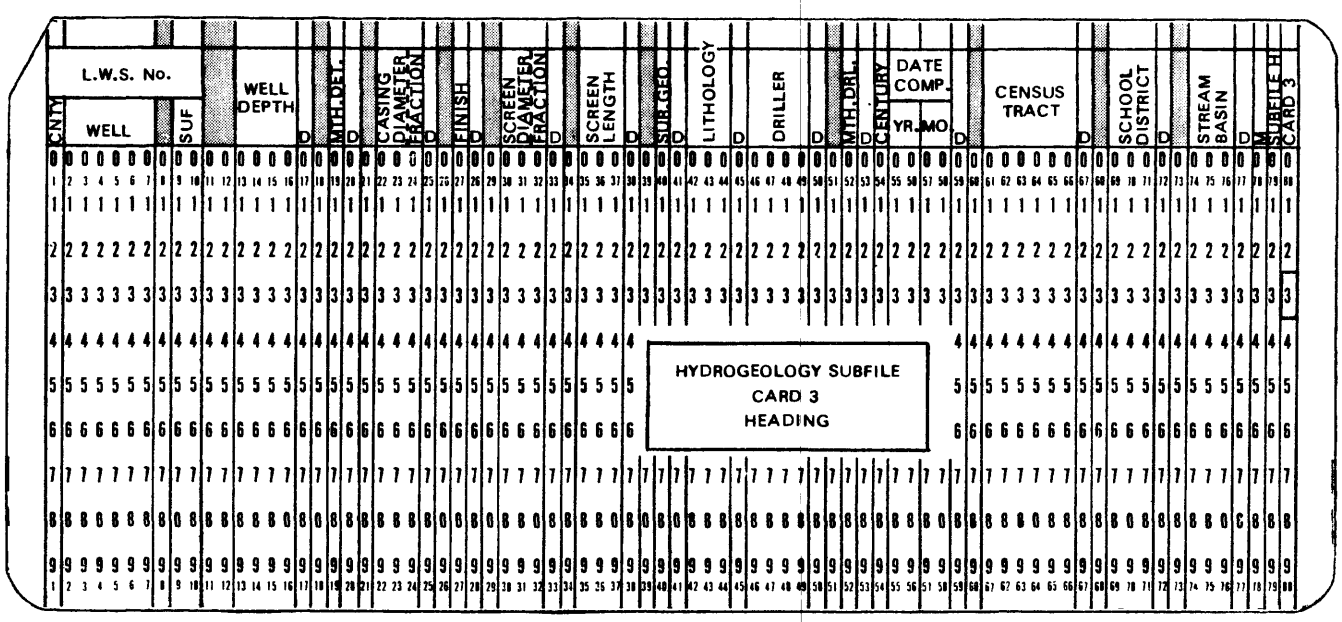
2 (fig. 10-1A)	a) L.W.S. number	h) well-field number
	b) well owner's name	i) L.I. water-supply application number (LIWA#)
	c) owner's well number	j) water-supply application number (WSA#)
	d) ownership of well	k) transaction code
	e) use of water	l) subfile code
	f) public water-supply area	m) card type.
	g) nonpublic-supply area	
3 (fig. 10-1B)	a) L.W.S. number	j) driller
	b) depth of well or test hole	k) method drilled
	c) method depth determined	l) date completed
	d) casing diameter	m) census tract
	e) finish	n) school district
	f) screen diameter	o) stream basin
	g) length of screened intervals	p) transaction code
	h) surficial geology	q) subfile code
	i) lithology of screened zone	r) card type
4 (fig. 10-1C)	a) L.W.S. number	f) horsepower
	b) altitude of measuring point	g) maximum yield of pump
	c) original static water level	h) primary log
	d) date of original static water level	i) secondary log
	e) lift type	j) other logs
		k) person correlating top of aquifer

Table 10-1.--Information on cards for input to hydrogeology subfile (continued).

Card	Contents	
4 (continued)	l) reliability of correlation	n) subfile code
	m) transaction code	o) card type
5 (fig. 10-1D)	a) L.W.S. number	d) transaction code
	b) ditch samples	e) subfile code
	c) core samples	f) card type
7 (fig. 10-1E)	a) L.W.S. number	d) transaction code
	b) hydrogeologic units	e) subfile code
	c) depth to hydrogeologic units	f) card type
H & P (fig. 7-3)	These cards are identical and contain	
	a) L.W.S. number	d) text line half indicator
	b) one half of one line of either historic (H) or publication (P) text	e) transaction code
		f) subfile code
	c) text line number	g) card type
8 (fig. 10-1F)	a) L.W.S. number	h) pumping-test information available
	b) yield during test	i) date of pumping test
	c) method yield determined	j) person making pumping test
	d) static water level	k) specific capacity
	e) pumping water level	l) transaction code
	f) accuracy of static and pumping water levels	m) subfile code
	g) pumping period	n) card type



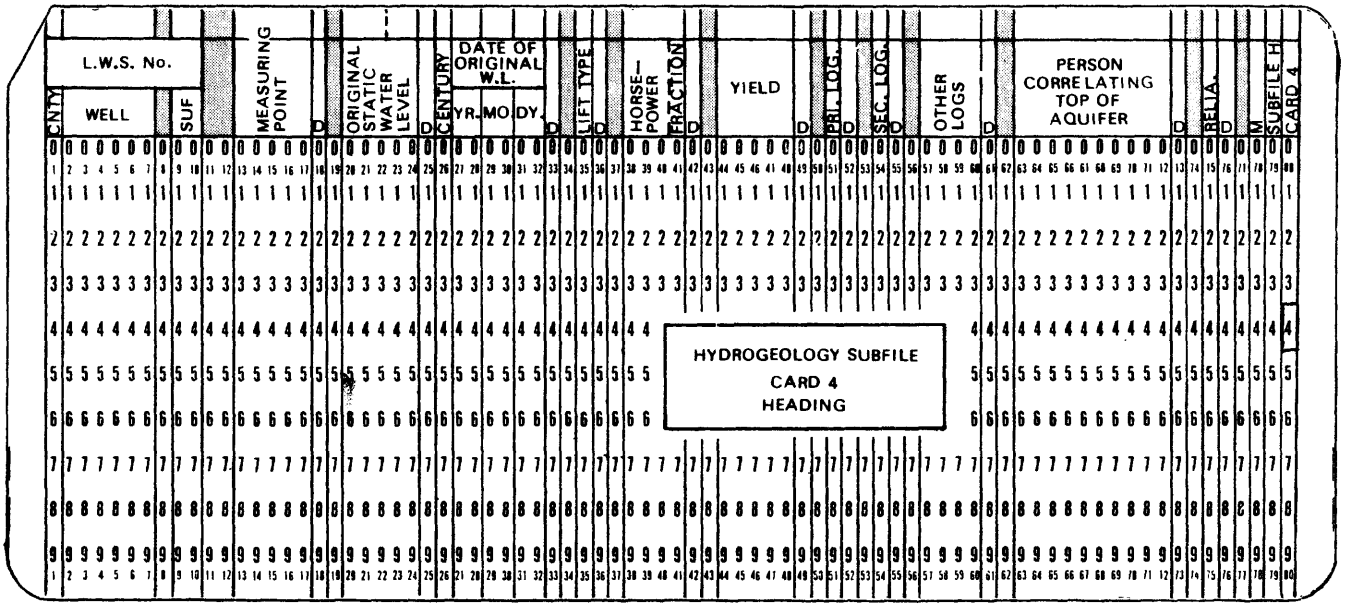
A



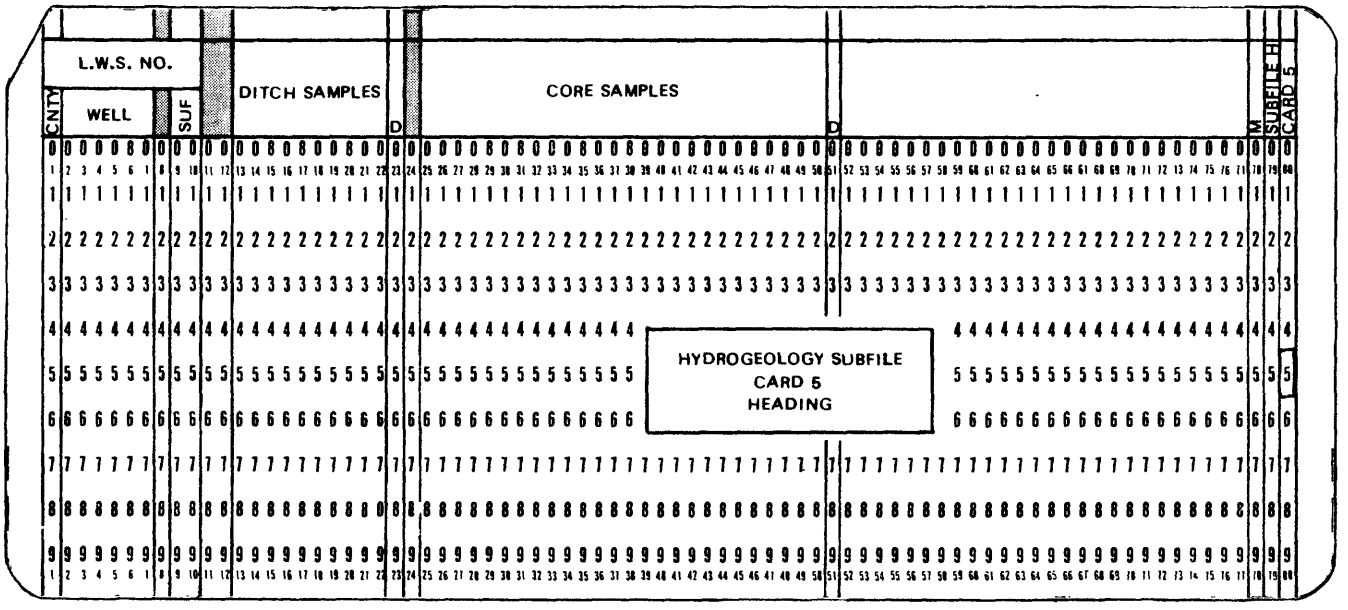
B

Figure 10-1.--Examples of hydrogeology subfile cards:

A. heading card 2; B. heading card 3.



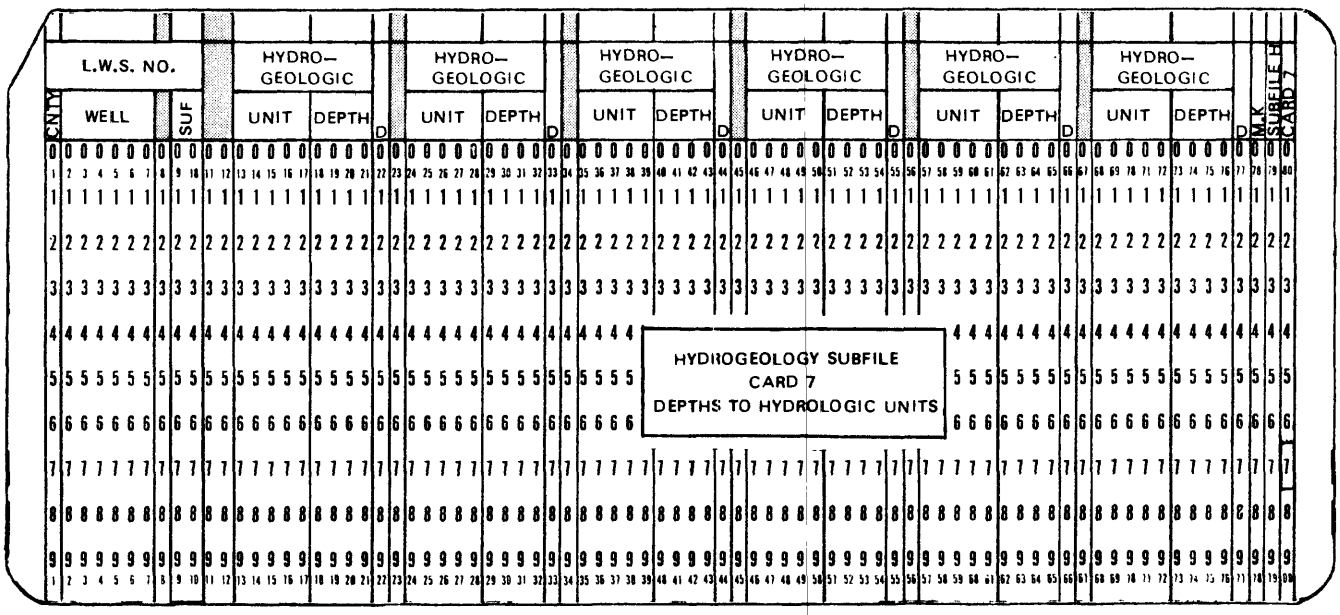
C



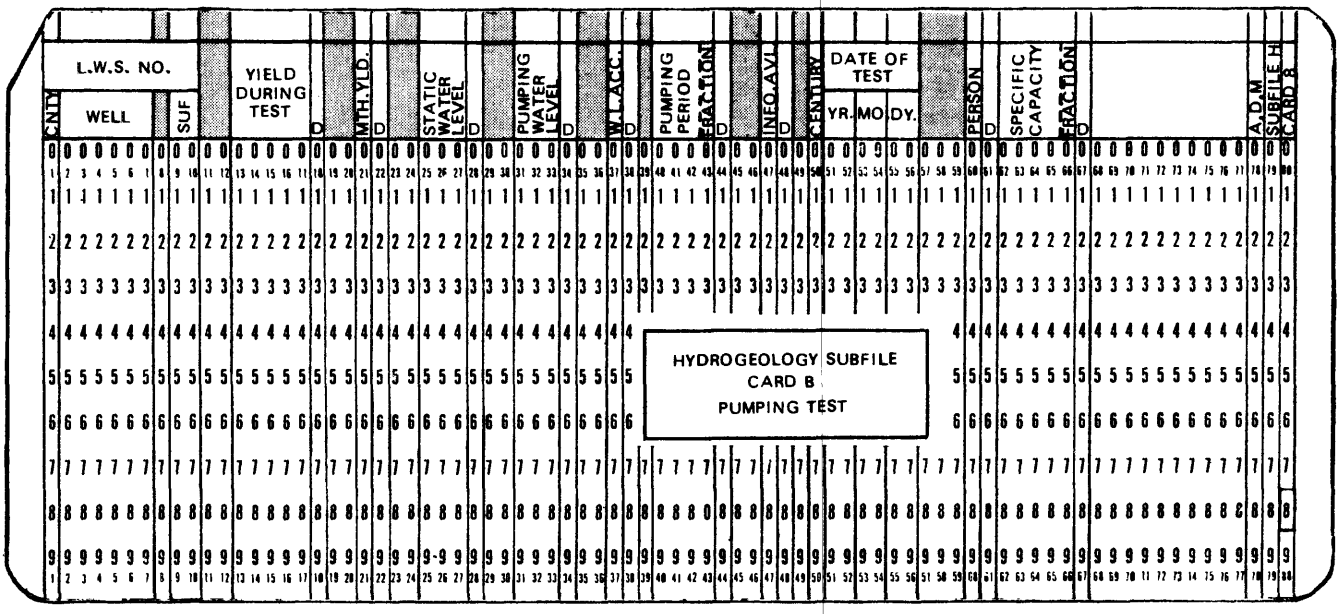
D

Figure 10-1.--Examples of hydrogeology subfile cards (continued):

C. heading card 4; D. heading card 5.



E



F

Figure 10-1.--Examples of hydrogeology subfile cards (continued):

E. depth to hydrogeologic unit card 7;
F. pumping-test card 8.

Table 10-2.--Nontransparent and transparent data fields in the hydrogeology subfile.

A. NONTRANSPARENT DATA FIELDS

L.W.S. number

Physical records available

Well owner's name

Owner's well number

Ownership of well

Use of water

Public water-supply area

Nonpublic-supply area

Well-field number

L.l. water-supply application number

Water-supply application number

Depth of well or test hole

Method depth determined

Casing diameter

Finish

Screen diameter

Length of screened intervals

Surficial geology

Lithology of screened zone

Driller

Method drilled

Date completed

Census tract

School district

Stream basin

Altitude of measuring point

Original static water level

Date of original static water level

Lift type

Horsepower

Maximum yield of pump

Primary log

Secondary log

Other logs

Person correlating top of aquifer

Reliability of correlation

Ditch samples

Core samples

Hydrogeologic units

Depth to hydrogeologic units

Historic text

Publication text

Table 10-2.--Nontransparent and transparent data fields in the hydrogeology subfile (continued).

A. NONTRANSPARENT DATA FIELDS (continued)

Pumping test:

1) yield during test
2) method yield determined
3) static water level
4) pumping water level
5) accuracy of static and pumping water levels
6) pumping period
7) pumping-test information available
8) date of pumping test
9) person making pumping test
10) specific capacity

B. TRANSPARENT DATA FIELDS

County
Subfile
Level
Tape number
Tape-creation year
Tape-creation day in year
Cycle number
40 words of operator text
3 levels of pointers
Record type flags
Number of hydrogeologic units stored

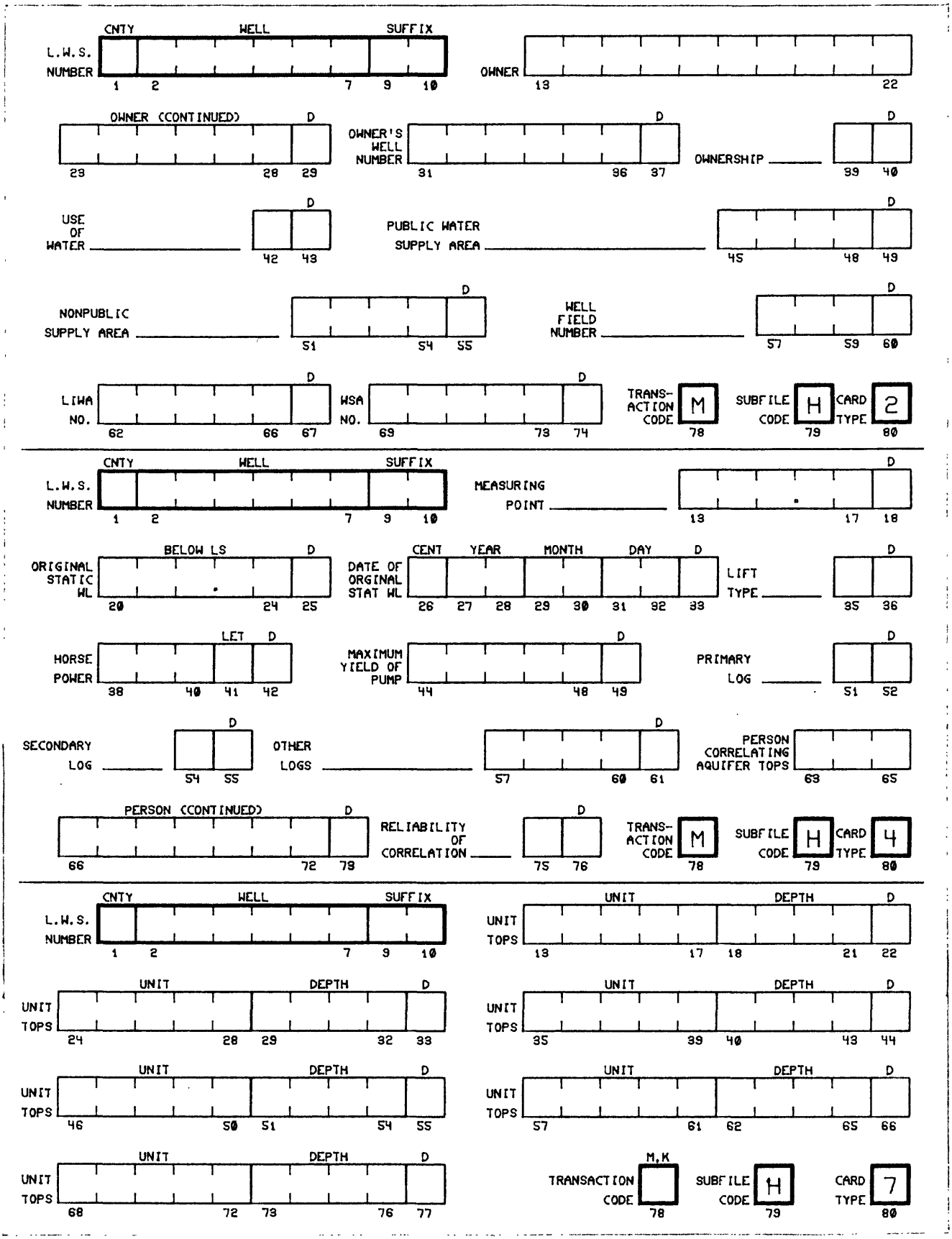


Figure 10-2.--Coding form for hydrogeology subfile cards 2, 4, and 7.

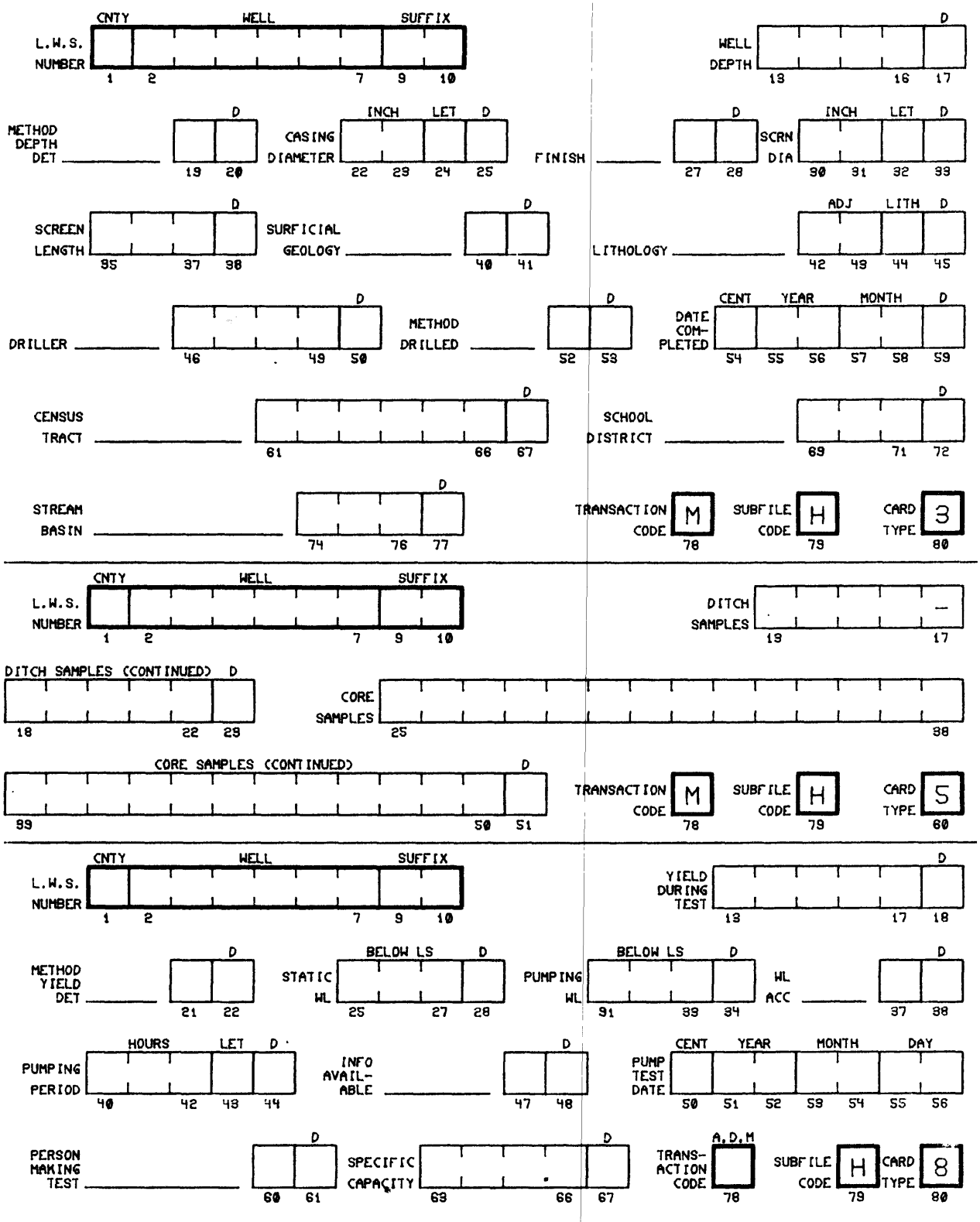


Figure 10-3.--Coding form for hydrogeology subfile cards 3, 5, and 8.

TRANSACTION CODES

(Column 78 on all cards)

Four transaction codes may be input to the hydrogeology subfile for processing, as described in table 10-3.

Table 10-3.--Transaction codes that may be input to hydrogeology subfile.

Code	Meaning
A	Add a well, line of text, or pumping-test data.
M	Modify the physical records available, heading data, line of text, or pumping-test data.
D	Delete a well, line of text, or pumping-test data.
K	Kill (delete) some or all of one kind of text.

FILE ORGANIZATION

Well data in the hydrogeology subfile are stored by county or section of a county. In most cases, several Linctapes will be needed to contain all well data for one county. Well data are stored on tape in ascending order by L.W.S. number to facilitate a standard sequential merge for updating purposes. (Note that this order may differ from the chronologic order within local well numbers by which the well data in the well-header file are stored.) The data are accessed through pointers stored in the well-header file that are created during a subfile merge.

INSTRUCTIONS FOR CODING THE PHYSICAL-RECORDS-AVAILABLE CARD

Adding a New Well

A new well (as well as the physical records available) may be entered into the hydrogeology subfile by submitting to program WDBINPUT a 1 card with the transaction code A as described in section 7, "The Well Data Base Subfiles." Note that the physical records available apply to the years for which pumping-test data are available and that the well must already be represented in the well-header file.

Deleting a Well

A well's record may be deleted by submitting a 1 card with the transaction code D to WDBINPUT. Note that everything stored for that well in the hydrogeology subfile will disappear.

Modifying the Physical Records Available

The physical records available for a well on file may be modified by submitting a 1 card with the transaction code M to WDBINPUT.

HYDROGEOLOGY SUBFILE CARDS 2-8, H, AND P

The fields coded on cards 2, 3, 4, 5, and 7 contain nontime-dependent data. The transaction code for cards 2, 3, 4, and 5 (heading data) must always be M (do not use A even if the data are being added for the first time). Individual data about pumping tests may be stored in the hydrogeology subfile by using card 8. Only one pumping test per day may be stored in the file for a given well. Blank fields are ignored, and the standard deletion box appears after each field to allow removal of the information in each field by coding a D. Historic text about the well site or pumping tests may also be stored in the hydrogeology subfile. The coding procedure is described in section 7, "The Well Data Base Subfiles." These cards are coded as shown in table 10-4.

Index to Table 10-4.--Instructions for coding the nine hydrogeology cards.

*Not available in 1982

Table 10-4.--Instructions for coding the nine hydrogeology cards.

To delete a field entirely from the file, code D in the appropriate deletion field. If an addition or change in the data in a field is needed, code only the appropriate field.

A. HYDROGEOLOGY HEADING CARD 2.

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11-12	Blank.
13-28	Well owner's name (left justified).
29	Code D to delete well owner's name.
30	Blank.
31-36	Owner's well number (left justified).--If owner has his own number (letters can be included) with which the well is identified, code it in these boxes.
37	Code D to delete owner's well number.
38	Blank.
39	Ownership of well.--For coding purposes, lodges and other nonprofit, nongovernment groups should be listed in the "corporation or company" category. "Private" refers to individual or family ownership or the estate of an individual. Code as shown below: 1. county 2 U.S. Government 3. city, village, or town 4. company 5. private (individual) 6. state 7. water district or water company 8. sewer district
40	Code D to delete ownership of well.
41	Blank.

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

A. HYDROGEOLOGY HEADING CARD 2.--continued

Column	Contents/instructions
42	Use of water.--Refers to purpose for which water from well is used. Code as shown below: 1. Air conditioning 2. commercial 3. fire protection 4. domestic 5. irrigation 6. industrial[1] 7. public supply[2] 8. institutional 9. unused A. recharge X. other
43	Code D to delete use of water.
44	Blank.
45-48	Public water-supply area (right justified).--Number assigned to a water district or other public water-supply company or agency within whose boundaries the well is situated. See list 10-A, on page 10-30.
49	Code D to delete public water-supply area.
50	Blank.
51-54	Nonpublic-supply area (right justified).--Four-digit number assigned to identify a specific nonpublic water supply. See list 10-B on page 10-33.
55	Code D to delete nonpublic-supply area.
56	Blank.
57-59	Well-field number (right justified).--Number assigned numerically to designate a specific nonpublic or public water supply well field. See list 10-C on page 10-37.
60	Code D to delete well-field number.

[1]If some product is manufactured, assembled, remodeled, or otherwise fabricated, use of water for that plant should be considered industrial even though water is not used directly in product or in manufacturing of product.

[2]If system supplies five or more homes, it should be considered public supply.

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

A. HYDROGEOLOGY HEADING CARD 2.--continued

Column	Contents/instructions
61	Blank.
62-66	Long Island water-supply application number (LIWA#) (right justified).--Application number assigned to nonpublic water supplies by the New York State Department of Environmental Conservation. Do not code W.
67	Code D to delete the LIWA number.
68	Blank.
69-73	Water-supply application number (WSA#) (right justified).--Application number assigned to applications relating to public water supplies by New York State Department of Environmental Conservation.
74	Code D to delete the WSA number.
75-77	Blank.
78	Code M always.--This field must be coded.
79	Code H always.--This field must be coded.
80	Code 2 always.--This field must be coded.

B. HYDROGEOLOGY HEADING CARD 3.

1-10	L.W.S. number.--This field must be coded.
11-12	Blank.
13-16	Depth of well or test hole (right justified).--Depth of well or test hole refers to the open depth below land surface of the well or test hole to the nearest foot. Only the most reliable figure for the depth at the time the coding form is completed should be coded.
17	Code D to delete depth of well or test hole.
18	Blank.

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

B. HYDROGEOLOGY HEADING CARD 3.--continued

Column	Contents/instructions
19	Method depth determined.--Refers to the accuracy of well-depth measurement. 1. Measured. Should be used only for measured depths made by Geological Survey or cooperating agencies. 2. Reported. Should be used for depth figures obtained from any other sources.
20	Code D to delete method depth determined.
21	Blank.
22-23	Casing diameter (right justified).--For drilled cased wells, diameter to be coded will be nominal inside diameter, in inches, of the innermost casing at land surface.
24	If fractions are needed, code as shown below: A. 1/4 inch C. 1/2 inch B. 1/3 inch D. 3/4 inch
25	Code D to delete casing diameter.
26	Blank.
27	Finish.--Refers to character and position of openings that permit water to enter the well. Code as shown below: 1. screen 4. sand point 2. screen with gravel pack 5. walled or shored 3. perforated or slotted casing X. other
28	Code D to delete finish.
29	Blank.
30-31	Screen diameter (right justified).--Diameter of well screen in inches.
32	If fractions are needed, code: A. 1/4 inch C. 1/2 inch B. 1/3 inch D. 3/4 inch

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

B HYDROGEOLOGY HEADING CARD 3.--continued

Column	Contents/instructions
33	Code D to delete screen diameter.
34	Blank.
35-37	Length of screened intervals (right justified).--If well has one or more screened interval(s), code total length of all screened or perforated intervals to nearest foot.
38	Code D to delete length of screened intervals.
39	Blank.
40	Surficial Geology.--Code as shown below: 1. Outwash plain 2. Harbor Hill moraine 3. Ronkonkoma moraine 4. intermorainal 5. barrier beach X. other
41	Code D to delete surficial geology.
42-44	Lithology of screened zone.--Refers to the mineral composition of material adjacent to screened interval. Code an adjective in columns 42 and 43 (right justified) and a lithologic code in column 44 (see list 10-D, on page 10-41). A code for column 44 may be used without a qualifying adjective (columns 42 and 43 may be left blank).
45	Code D to delete lithology of screened zone.
46-49	Driller (right justified).--Code number that refers to name of well driller or drilling company. See list 10-E on page 10-42 for codes.
50	Code D to delete driller.
51	Blank.
52	Method drilled.--Refers to method used to construct or drill well. Code as shown below: 1. rotary 2. air rotary 3. hydraulic rotary 4. reverse rotary 5. driven 6. bored or augered 7. dug 8. jetted 9. cable tool X. other

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

B. HYDROGEOLOGY HEADING CARD 3.--continued

Column	Contents/instructions
53	Code D to delete method drilled.
54	Century-adjust for date completed.--Leave blank for 1900, code - for 1800 or + for 2000.
55-58	Date completed.--Date drilled or completed refers to date well or test hole was completed. Code year (right justified) in columns 55-56, and month (right justified) in columns 57-58.
59	Code D to delete date completed.
60	Blank.
61-66	*Census tract (right justified).--Code the census tract number for area well is in. See list 10-F on page 10-46.
67	Code D to delete census tract.
68	Blank.
69-71	*School district (right justified).--Code school district number for area well is in. See list 10-G on page 10-47.
72	Code D to delete school district.
73	Blank.
74-76	*Stream basin (right justified).--Code stream basin number that the well is in, if applicable. See list 10-H on page 10-49.
77	Code D to delete stream basin.
78	Code M always.--This field must be coded.
79	Code H always.--This field must be coded.
80	Code 3 always.--This field must be coded.

*This information is most readily obtained by plotting the well on a map on which the area's boundaries are drawn.

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

C. HYDROGEOLOGY HEADING CARD 4.

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11-12	Blank.
13-17	Altitude of measuring point (right justified).--Altitude of measuring point, to hundredths of a foot. A decimal point is assumed to be between columns 15 and 16.
18	Code D to delete altitude of measuring point.
19	Blank.
20-24	Original static water level (right justified).--First reported water level. Code to hundredths of a foot below land surface. A decimal point is assumed to be between columns 22 and 23. If well was flowing, code 99999.
25	Code D to delete original static water level.
26	Century adjust for date of original static water level.--Leave blank for 1900, code - for 1800 or + for 2000.
27-32	Date of original static water level.--Code in the order: year (2 digits, right justified), month (right justified), day (right justified).
33	Code D to delete date of original static water level.
34	Blank.
35	Lift type.--Refers to type of pump or other conveyance used to bring water to land surface. Code as shown below: 1. Centrifugal 2. jet 3. multiple centrifugal 4. multiple turbine 5. submersible 6. turbine 7. none X. other
36	Code D to delete lift type.
37	Blank.

Table 10-4.--Instructions for coding the nine hydrogeology cards (continued).

C. HYDROGEOLOGY HEADING CARD 4.--continued

Column	Contents/instructions
38-40	Horsepower (right justified).--Horsepower of pump.
41	If fractions are needed, code as shown below. A. 1/4 horsepower C. 1/2 horsepower B. 1/3 horsepower D. 3/4 horsepower
42	Code D to delete horsepower.
43	Blank.
44-48	Maximum yield of pump (right justified).--Maximum known or reported yield of pump, in gallons per minute.
49	Code D to delete maximum yield of pump.
50	Blank.
51	Primary log.--Refers to main log used for correlation of hydrogeologic units. Code as shown: 1. Gamma ray log 5. geologists log 2. electric log 6. temperature log 3. drillers log 7. neutron 4. caliper log X. other
52	Code D to delete primary log.
53	Blank.
54	Secondary log.--Refers to secondary log used for correlation of hydrogeologic units. See Primary log for available codes.
55	Code D to delete secondary log.
56	Blank.

Table 10-4.--Instructions for coding the nine hydrogeology cards (continued).

C. HYDROGEOLOGY HEADING CARD 4.--continued

Column	Contents/instructions
57-60	Other logs.--Refers to other types of logs available. Insert first code in column 57, second code in 58, etc. For available codes see primary log. To add or change one or more of the other logs, all other logs must be recoded. For example, if other logs were: 1 4 X b[1] and the 4 is to be deleted and X changed to 6, code 1 6 b b[1]. (Note that the 1 had to be coded again).
61	Code D to delete all other logs.
62	Blank.
63-72	Person correlating top of aquifer (left justified).--Enter name of person doing correlation.
73	Code D to delete name of person correlating top of aquifer.
74	Blank.
75	Reliability of correlation.--1. Good 2. Fair 3. Poor
76	Code D to delete reliability of correlation.
77	Blank.
78	Code M always.--This field must be coded.
79	Code H always.--This field must be coded.
80	Code 4 always.--This field must be coded.

[1]b = blank

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

D. HYDROGEOLOGY HEADING CARD 5.

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11-12	Blank.
13-22	Ditch samples.--Code the minimum and maximum depth, in feet below land surface, for which samples are available. Hyphen is constant in column 17. Code range before and after the hyphen. For example: 100-253.
23	Code D to delete ditch samples.
24	Blank.
25-50	Core samples (left justified).--Code whatever depths, in feet below land surface, for which samples are available. For example: 100-250, 320, 340-350.
51	Code D to delete core samples.
52-77	Blank.
78	Code M always.--This field must be coded.
79	Code H always.--This field must be coded.
80	Code 5 always.--This field must be coded.

E. HYDROGEOLOGY HEADING CARD 6.

This card is a spare with nothing on it at this time.

F. HYDROGEOLOGY DEPTH TO HYDROGEOLOGIC UNITS CARD 7.

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11-12	Blank.

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

F. HYDROGEOLOGY DEPTH TO HYDROGEOLOGIC UNITS CARD 7.--continued

Column	Contents/instructions
13-17 24-28 35-39 46-50 57-61 68-72	Hydrogeologic units (left justified).--Enter a five-character alphabetic code. See table 3-5 on page 3-15, in "Coding Instructions for Entering, Updating and Deleting Well Information in the Well-Header File" for a listing. Code only the alphabetic, not the numeric, part.
18-21 29-32 40-43 51-54 62-65 73-76	Hydrogeologic unit depths (right justified).--Code depth to top of the corresponding hydrogeologic unit, to nearest foot.
22 33 44 55 66 77	Code D to delete the corresponding hydrologic unit and its depth (see below).
23 34 45 56 67	Blank.

NOTE: To change a unit, delete that unit and its corresponding depth by coding the unit and placing a D in the appropriate column. Then enter correct unit and depth.

To change a depth, code the hydrogeologic unit for that depth and the new depth that goes with it.

Example 1: If the file contains

MGTY 1625 GLCLU1275

and you wish to change GLCLU to BCPX, code:

GLCLUbbbbD[1]	BCPXb1275[1]
(delete glacial aquifer)	(Input bedrock)

[1]b = blank

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

F. HYDROGEOLOGY DEPTH TO HYDROGEOLOGIC UNITS CARD 7.--continued

Example 2: If the file contains

MGTY 1625

GLCLU1275

and you wish to change the depth of GLCLU to 1,000 feet, code GLCLU1000.

A well may be assigned up to 12 hydrogeologic units and depths. Thus, more than one "7" card can be used.

Column	Contents/instructions
78	Transaction Code.--This field must be coded. Code K only to delete all units and depths currently stored for the well (leave the rest of the card blank). This can avoid much coding when a large number of units must be deleted. Code M in all other cases.
79	Code H always.--This field must be coded.
80	Code 7 always.--This field must be coded.

G. HYDROGEOLOGY SUBFILE CARDS H & P (Text).

Both historic and publication text for a well may be stored in the hydrogeology subfile. However, the purpose and use of publication text has not been defined and should not be used.

H. HYDROGEOLOGY PUMPING TEST CARD 8.

To delete a field entirely from the file, code D in the appropriate deletion field. To delete an entire pumping test, code D in column 78 of this card and the date of test. If an addition or change in the data in a field is needed, code only the appropriate field and date of test.

Column	Contents/instructions
1-10	L.W.S. number.--This field must be coded.
11-12	Blank.

Table 10-4.--Instructions for coding the nine hydrogeology cards (continued).

H. HYDROGEOLOGY PUMPING TEST CARD 8.--continued

Column	Contents/instructions
13-17	Yield during test (right justified).--Yield of well, in whole gallons per minute during test.
18	Code D to delete yield during test.
19-20	Blank.
21	Method yield determined.--Code method used to determine yield of well during test as shown below: 1. Volumetric 2. meter or pilot tube 3. bailer 4. orifice 5. weir or flume 6. venturi 7. free fall 8. estimated X. other
22	Code D to delete method yield determined.
23-24	Blank.
25-27	Static water level (right justified).--Refers to static water level before test. Code static water level, to nearest foot below land surface. If well was flowing code 999.
28	Code D to delete static water level.
29-30	Blank.
31-33	Pumping water level (right justified).--Refers to pumping water level during test. Code pumping water level to nearest foot below land surface.
34	Code D to delete pumping water level.
35-36	Blank.
37	Accuracy of static and pumping water levels.--Refers to apparent accuracy of method of measurement used to determine water levels reported in columns 25-33. Use codes 1 or 2 for measurements made by Geological Survey only. Code accuracy of water-level measurement as shown below: 1. within 1 foot 2. not within 1 foot 3. airline 4. reported 5. estimated 6. manometer 7. pressure gage

Table 10-4.--Instructions for coding the nine hydrogeology cards (continued).

H. HYDROGEOLOGY PUMPING TEST CARD 8.--continued

Column	Contents/instructions
38	Code D to delete accuracy.
39	Blank.
40-42	Pumping period (right justified).--Refers to length of pumping test. Code length of pump test, in hours.
43	If fractions are needed, code as shown below. Code fraction in column 43: A. 1/4 hour B. 1/3 hour C. 1/2 hour D. 3/4 hour
44	Code D to delete pumping period.
45-46	Blank.
47	Pumping-test information available.--Refers to information on length of pumping test and water-level measurements made during test. Code pumping-test information available as shown below: 1. 48-hour test or longer, with complete drawdown measurements 2. 24-hour pump test, with complete drawdown measurements 3. 8-hour pump test, or less, with complete drawdown measurements 4. Specific capacity test only.
48	Code D to delete pumping test information available.
49	Blank.
50	Century-adjust for date of pumping test.--Leave blank for 1900, code - for 1800 or + for 2000.
51-56	Date of pumping test.--Code date of test in the following order: year (2 digits, right justified), month (right justified), day (right justified).

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

H. HYDROGEOLOGY PUMPING TEST CARD 8.--continued

Column	Contents/instructions
	Date must always be coded because it determines which test the information on the card refers to. More than one test can be coded for a given well, but not on the same date. No deletion box is associated with date of test. Deleting the date is considered the same as deleting everything connected with the test, therefore a D would be coded in column 78. If a date is in error, then that date and all the information must be deleted (D in column 78), and a new card for the correct date and its data must be coded. Only the date is needed to delete a pumping test.
57-58	Blank.
60	Person making pumping test.--See list 10-I on page 10-49.
61	Code D to delete name of person making pumping test.
62	Blank.
63-66	Specific capacity (right justified).--Code specific capacity of the well to the nearest tenth only if it cannot be computed from the yield, and static and pumping water levels. A decimal point is assumed to be between columns 65 and 66.
67	Code D to delete specific capacity.
68-77	Blank.
78	Transaction code.--This field must be coded. Code A if adding a new test. Code M if modifying data on an existing test. Code D if entire test is to be deleted.
79	Code H always.--This field must be coded.
80	Code 8 always.--This field must be coded.

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List A--Public water-supply-area codes for Nassau and Suffolk Counties

NASSAU COUNTY

Owner[1]	Code Number	Owner[1]	Code Number
Albertson W.D.	001	Manhasset-Lakeville W.D.	025
Bayville, Village of	002	Massapequa W.D.	026
Bethpage W.D.	003	Mill Neck Estates, Inc.,	046
Bowling Green Estates W.D.	004	Association of Owners of	
Carl Place W.D.	005	Mineola, Village of	027
		New York, City of	061
Citizens Water Supply Co.	006		
East Meadow W.D.	007	New York Water Service	029
East Williston W.D.	008	Old Westbury, Village of	030
Farmingdale, Village of	009	Oyster Bay W.D.	031
Franklin Square W.D.	010	Plainview W.D.	032
		Plandome, Village of	033
Freeport, Village of	011		
Garden City, Village of	012	Port Washington W.D.	034
Garden City Park W.D.	013	Rockville Centre, Village of	035
Garden City South W.D.	014	Roosevelt Field W.D.	036
Glen Cove, City of	028	Roslyn W.D.	037
		Sands Point, Village of	038
Glenwood W.D.	015		
Hempstead, Village of	016	Sea Cliff Water Co.	039
Hicksville W.D.	017	Sel-Vra-Acres, Association	045
Jamaica Water Supply Co.	018	of Property Owners of	
Jericho W.D.	019	South Farmingdale W.D.	040
		Uniondale W.D.	041
Levittown W.D.	020	Westbury W.D.	042
Lido-Point Lookout W.D.	021		
Locust Valley W.D.	022	West Hempstead-Hempstead	043
Long Beach, City of	023	Gardens W.D.	
Long Island Water Corp.	024	Williston Park, Village of	044

[1]WD = Water District

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List A--Public water-supply-area codes for Nassau and Suffolk Counties.--continued

SUFFOLK COUNTY

Owner	Code Number
Brentwood W.D.	101
Cherry Grove W.D.	102
Dering Harbor Village	103
Dix Hills W.D.	104
East Farmingdale W.D.	105
Fair Harbor W.D.	106
Fire Island Pines W.D.	107
Greenlawn W.D.	108
Greenport Village	109
Hampton Bays W.D.	110
Ocean Beach Village	111
Riverhead W.D.	112
Riverside W.D.	113
Saltaire Village	114
Smithtown W.D.	115
South Huntington W.D.	116
St. James W.D.	117
Stony Brook W.D.	118
Suffolk County Water Authority	
Amityville Plant	119
Babylon Plant	120
Bay Shore Plant	121
East Hampton Plant	122
Huntington Plant	123
Northport Plant	124
Patchogue Plant	125
Port Jefferson Plant	126
Sag Harbor Plant	127
Smithtown Plant	128
Southampton Plant	129
Westhampton Beach Plant	130
Amagansett Water Company	131
B & C Enterprises	132
Baiting Hollow Lodge	133
Bevon Water Corp.	134
Blue Point Community Association	135
Bridgehampton Water Company	136
Captain Kidd Water Company	137
Cedar Grove Park	138
Cedar Water Supply Company	139
Colony Beach Front Association	140
Community Water Corporation	141
Conforti, Joseph A.	142
Crystal Brook Park Association	143
Culcross Corp.	144
Davis Park Water Works	145
Dune Realty Corp.	146
Dunewood Water Corp.	147
Eastern Suffolk Water Corp.	148
Fisher's Island Estates	149
Frera Realty Corp.	150
Great Beach Water Corp.	151
Hallock Acres Water Works	152
Hargis, Rollin	153
Herod Point Estates	154
High Oaks Association	155
Kismet Water Corp.	156
Kreiger, Joseph J.	157
Lakeview Beach	158
Lakoma Manor, Inc.	159
Lapham, Edwin	160

Table 10-4.--Instructions for coding the nine hydrogeology cards (continued).

List A--Public water-supply-area codes for Nassau and Suffolk Counties.--continued

SUFFOLK COUNTY (continued)

Owner	Code Number	Owner	Code Number
Malin, Ann K.	161	Solid Building Company	181
Manor Lane Gardens	162	Sound Shore Club Corp.	182
Montauk Water Supply Corp.	163	Soundview Association	183
Murtha, John T.	164	Speonk Gardens, Inc.	184
Ocean Bay Park Water Corp.	165	Suffolk Improvement Corp.	185
Panoramic Apartments	166	Surfside Water Corp.	186
Parsnip Pond Water Works Corp.	167	Sunhill Water Corp.	187
Pine Crest Gardens, Inc.	168	Swan Lake Water Corp.	188
Point O'Woods Association	169	Terraces on the Sound	189
Roanoke Water Company	170	Thurm, Arthur B.	190
Rockhall Water Works	171	West Gilgo Beach Association	191
Rogers, Charles	172	West Meadow Beach Association	192
Ronkonkoma Water Company	173	Wildwood Lake Development Corp.	193
Scott's Beach, Inc.	174	Woodbury Triangle Association	194
Sea View Utilities	175		
Selden Water Company	176		
Shelter Island Heights Association	177		
Shirley Water Company	178		
Shorewood Water Company	179		
Sini, Anthony	180		

Table 10-4.--Instructions for coding the nine hydrogeology cards (continued).

List B.--Nonpublic-Supply-Area Codes for Nassau County.

Owner or Well User	Code Number	Owner or Well User	Code Number
Abilities Inc.	1000	Certified Industries	1023
America Bosch Arma Corp.	1001	Preferred Sand and Stone Co.	1023
Roosevelt Project One, Inc.	1001	Certified Redi-Mix Co., Inc.	1024
American Ice Co.	1002	Charter Oaks Club, Inc.	1025
Amityville Laundry	1003	Chemco, Inc.	1026
Amityville Laundry and Dry Cleaning	1003	Powers Chemco, Inc.	1026
Amneg Plastics Corp.	1004	Cherry Valley Club, Inc.	1027
PAV Industries Corp.	1004	Circle Wire and Cable Corp.	1028
Approved Sand and Gravel Corp.	1005	Locust Grove Conduit Corp.	1028
Certified Sand and Gravel Corp.	1005	Claremont Polychemical Corp.	1029
Checola, Michael	1005	Clark, F. Ambrose	1030
Arnold Brilhart, Ltd.	1006	Coca-Cola Bottling Co.	1031
Aurora Plastics Corp.	1007	Colonial Sand and Stone Co., Inc.	1032
Automatic Industries, Inc.	1008	Columbia Ribbon and Carbon Mfg. Co.	1033
B. Altman & Co.	1009	Community Hospital at Glen Cove	1034
Beaver Dam Winter Sports Club	1010	Consolidated Lithographing Corp.	1035
Bernard Screen Printing Corp.	1011	Country Club Land Corp.	1036
Bernhardt, R. A., and Stein, D. O.	1012	Country Life Press Corp.	1037
Bethpage State Park	1013	Doubleday and Company, Inc.	1037
Bethpage Realty Corp.	1014	County Community Corp.	1038
Bischoff Chemical Corp.	1015	County of Nassau	1039
Metco Inc.	1015	The Creek, Inc.	1040
Board of Education, School District No. 1	1016	Crestwood Dairy, Inc.	1041
Branch Laundry Corp.	1017	Deepdale Inc.	1042
Brookville Syndicate Inc.	1018	Diocese of Rockville Centre	1043
Bruce, A. M., Mrs.	1019	East Rockaway Laundry Corp.	1044
Bruce, David K. E., Mrs.	1019	Eastwood Realty Corp.	1045
Camp Bauman, Inc.	1020	Edgecombe Construction Corp.	1046
Central High School District No. 3	1021	General Instrument Corp.	1046
Century Circuit, Inc.	1022	Empire Billet Corp.	1047

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List B.--Nonpublic-Supply-Area Codes for Nassau County (continued).

Owner or Well User	Code Number
Fairchild Camera and Instrument Corp.	1048
Federated Department Stores	1049
Franklin National Bank	1050
Fresh Meadow Country Club	1051
Furman, Edward	1052
Garden City Country Club, Inc.	1053
Garden City Golf Club	1054
General Bronze Corp.	1055
Gilas, Anthony D. and Sons	1056
Glasfloss Manufacturing Co., Inc.	1057
Grumman Aircraft Engineering	1057
Pittsburg Plate Glass Co.	1057
Glen Cove Bottling Co., Inc.	1058
Glen Head Country Club, Inc.	1059
Glen Oaks Club, Inc.	1060
Goldstein, Meyer	1061
Great Neck Estates, Village of	1062
Grumman Aircraft Engineering	1063
Grumman Aerospace Corp.	1063
Guest, Winston	1064
Helena Rubenstein, Inc.	1065
Hempstead Golf Club	1066
Hempstead, Town of	1067
Hewlett Harbor Country Club	1068
Hewlett Harbor Golf Club	1068
Seawane Corp.	1068
Seawane Golf and Country Club	1068
Hofstra College	1069
Hunter Douglas Corp. Inc.	1070
Rubber Corporation of America, Inc.	1071
Insular Chemical Corp.	1071
Revertex Corporation of America	1071
Inwood Country Club	1072
Island Trees Corp. et al	1073
Jamison Plastic Corp.	1074
Jones Beach State Parkway Authority	1075
Jones Beach State Park	1075
Jowade Realty Corp.	1076
H. O. Penn Machinery Co.	1076
Kollsman Instrument Corp.	1077
Laboratory Furniture Co., Inc.	1078
Lake Success, Village of	1079
Lawrence, Village of	1080
Lease Plan International Corp.	1081
Lever Company	1082
Levitt & Sons, Inc.	1083
Levitt, William J.	1084
Liberty Aircraft Products Corp.	1085
Liberty Products Corp.	1085
Liesrr Realty Corp.	1086
North Hills Golf Club	1086
Lizza Asphalt Construction Co.	1087
Long Island Home Ltd.	1088
Long Island Lighting Co.	1089
Long Island University	1090
Post College	1090
Lake Success Quadrangle Corp.	1091

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List B.--Nonpublic-Supply-Area Codes for Nassau County (continued).

Owner or Well User	Code Number	Owner or Well User	Code Number
L. S. Q. Corp.	1091	Rockville Links Corp.	1118
Manhasset French Hand Laundry	1092	Rolling Hills Country Club, Inc.	1119
Mansol Holding Corp.	1093	Engineers Country Club	1119
Mason Au and Magenheimer Confectionary Mfg. Co. Inc.	1094	Roosevelt Field, Inc.	1120
Meadow Brook Club	1095	Blanchard Press Inc.	1121
		Roosevelt Raceway, Inc.	1122
Middle Bay Golfers Assoc.	1096	Roosevelt Nassau Operating Corp.	1123
Mill River Club, Inc.	1097	Gimbels	1123
Monaco at Lido International Surf Club	1098	S. B. Construction Corp.	1124
Muttontown Golf and Country Club	1099	S. Schiffman Plant	1125
Nassau Country Club, Inc.	1100	Sands Point Country Club Day School	1126
National Par 3 Golf, Inc.	1101	Sands Point Golf Club, Inc.	1127
9113 Corporation	1102	Sea and Surf Developers, Inc.	1128
North Hempstead Country Club	1103	Seaford-Mar Marina Inc.	1129
North Shore Country Club	1104	Servomechanisms, Inc.	1130
Union Free School District No. 11	1105	Sessa Leonard	1131
Oceanside Public Schools	1105	Shelbourne-Grand Hotel Co., Inc.	1132
Old Westbury Gardens Inc.	1106	Singer Sewing Machine Co.	1133
Old Westbury Golf and Country Club	1107	Slater Electric Inc.	1134
Oyster Bay, Town of	1108	Sommer, Sigmund	1135
P. G. C. Holding Corp.	1109	Sonic Recording Products, Inc.	1136
Peninsula Golf Club	1109	Southern State Parkway Golf Club	1137
Pall Corp.	1110	Sperry Gyroscope Co., Inc.	1138
Peninsula Laundry Inc.	1111	Sperry Corp.	1138
Photocircuits Corp.	1112	State Laundry Co. Inc.	1139
Pine Hollow Country Club, Inc.	1113	State of New York	1140
Piping Rock Club	1114	State University of New York	1141
Plastic Materials and Polymers, Inc.	1115	Planting Fields Campus	1141
Residential Trans-Mix Corp.	1116	Sterling Estates, Inc.	1142
R. H. Macy and Co., Inc.	1117	Stewart Manor Country Club	1143
Rockville Country Club, Inc.	1118		

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List B.--Nonpublic-Supply-Area Codes for Nassau County (continued).

Owner or Well User	Code Number
Strathmore Realty Co.	1144
Suburbia Realty Corp.	1145
Sunrise Federal Savings and Loan Assoc.	1146
Tam O'Shanter Golf Club, Inc.	1147
Temple Gates of Zion et al	1148
Tire Realty	1149
T. O. D. Manufacturing Co., Inc.	1150
Toren Inc.	1151
Mid-Island Hospital	1151
Union Free School District No. 5	1152
Levittown P.S.	1152
Union Free School District No. 20	1153
Lynbrook P.S.	1153
Union Free School District No. 22	1154
Farmingdale P.S.	1154
Union Free School District No. 23	1155
Massapequa P.S.	1155
Union Free School District No. 26	1156
Island Trees P.S.	1156
Union Free School District No. 27	1157
West Hempstead P.S.	1157
U.S. Printing and Lithograph Co.	1158
Valley Stream Central High School District	1159
Valley Stream Concrete Transmix	1160
Valley Stream, Village of	1161
Wah Chang Smelting and Refining Co. of America, Inc.	1162
Wah Chang Trading Corp.	1162
Waldemar Medical Research Foundation	1163
Wheatley Hills Golf Club, Inc.	1164
Whitney, John Hay	1165
Woodmere Club, Inc.	1166
Zara Asphalt Co., Inc.	1167
Freeport, Village of	1168
Long Island Railroad Co.	1169
Merchant Marine Academy	1170

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List C.--Well-field number codes for Nassau County Nonpublic-Water-Supply Areas

Well Number	Well Field Code	Well Number	Well Field Code	Well Number	Well Field Code
N-67	1168 001	N-1804	1138 001	N-1982	1168 001
71	1118 001	1806	1002 001	1983	1168 001
102	1164 001	1818	1138 001	1984	1168 001
111	1089 001	1840	1085 001	1985	1168 001
121	1040 001	1849	1089 001	2002	1089 001
N-128	1075 001	N-1850	1089 001	N-2027	1125 001
129	1075 002	1851	1089 001	2042	1003 001
189	1013 001	1852	1089 001	2060	1058 001
190	1013 001	1853	1089 001	2087	1033 001
558	1092 001	1858	1138 001	2103	1008 001
N-576	1169 001	N-1859	1063 002	N-2104	1008 001
597	1068 002	1911	1063 002	2112	1037 001
598	1068 001	1912	1063 002	2126	1051 001
602	1137 001	1914	1053 001	2127	1051 001
617	1013 001	1916	1002 001	2128	1051 001
N-638	1107 001	N-1917	1162 001	N-2129	1051 001
652	1068 002	1922	1063 002	2130	1051 001
653	1068 002	1923	1063 001	2131	1051 001
654	1068 001	1926	1170 001	2169	1051 001
655	1068 001	1960	1063 001	2175	1008 001
N-660	1026 001	N-1961	1063 002	N-2208	1140 001
661	1026 001	1963	1063 001	2209	1140 001
1332	1060 001	1965	1085 001	2210	1140 001
1488	1037 001	1966	1032 001	2211	1140 001
1631	1039 001	1971	1168 001	2227	1070 001
N-1658	1063 001	N-1972	1168 001	N-2238	1169 002
1665	1063 001	1973	1168 001	2316	1110 001
1666	1063 001	1974	1168 001	2364	1066 001
1678	1085 001	1975	1168 001	2365	1066 002
1773	1030 001	1976	1168 001	2366	1066 002
N-1788	1144 001	N-1977	1168 001	N-2409	1140 001
1797	1063 002	1978	1168 001	2410	1140 001
1798	1063 002	1979	1168 001	2418	1055 001
1800	1002 001	1980	1168 001	2419	1055 001
1801	1002 001	1981	1168 001	2422	1094 001

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List C.--Well-field number codes for Nassau County Nonpublic-Water-Supply Areas (continued).

Well Number	Well Field Code	Well Number	Well Field Code	Well Number	Well Field Code
N-2424	1089 001	N-3752	1065 001	N-5233	1098 001
2527	1094 001	3758	1078 001	5305	1063 002
2576	1060 001	3838	1048 001	5306	1063 002
2582	1073 001	3859	1130 001	5332	1005 002
2584	1032 002	3860	1048 002	5334	1072 001
N-2588	1130 001	N-3874	1048 002	N-5335	1024 001
2616	1059 001	3875	1044 001	5353	1056 001
2626	1158 001	3898	1089 003	5368	1071 001
2627	1158 001	3899	1089 003	5390	1071 001
2639	1088 001	3900	1089 003	5406	1020 001
N-2791	1014 001	N-3908	1001 001	N-5407	1020 001
2923	1039 002	3925	1031 001	5441	1143 001
3056	1118 001	3926	1166 001	5450	1119 001
3081	1118 001	4010	1085 001	5484	1120 001
3129	1039 003	4058	1005 001	5485	1120 002
N-3243	1039 004	N-4122	1049 001	N-5486	1120 003
3310	1089 002	4125	1032 003	5503	1020 001
3311	1032 003	4173	1138 001	5507	1117 001
3435	1038 001	4215	1083 004	5535	1042 001
3450	1071 001	4300	1074 001	5593	1041 001
N-3461	1038 002	N-4329	1155 001	N-5672	1010 001
3498	1108 001	4384	1007 001	5677	1077 001
3534	1069 001	4410	1076 001	5705	1108 002
3562	1153 001	4431	1023 001	5708	1065 001
3569	1028 001	4462	1104 001	5768	1132 001
N-3570	1067 004	N-4463	1151 001	N-5851	1030 002
3582	1083 001	4633	1095 001	5901	1024 002
3584	1083 002	4708	1057 001	5994	1034 001
3634	1083 003	4760	1113 001	6003	1062 001
3636	1139 001	4891	1113 001	6045	1050 001
N-3699	1035 001	N-5058	1131 001	N-6046	1122 001
3700	1035 001	5071	1100 001	6062	1129 001
3734	1111 001	5129	1075 003	6096	1142 001
3742	1103 001	5149	1089 003	6119	1000 001
3746	1108 001	5167	1148 001	6158	1041 001

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List C.--Well-field number codes for Nassau County Nonpublic-Water-Supply Areas (continued).

Well Number	Well Field Code	Well Number	Well Field Code	Well Number	Well Field Code
N-6170	1102	N-6863	1161 001	N-7362	1043 001
6171	1102	6864	1044 001	7406	1050 001
6172	1102	6905	1027 001	7419	1019 001
6173	1102	6911	1129 001	7420	1163 001
6174	1102	6918	1047 001	7427	1112 001
N-6202	1130 002	N-6951	1001 001	N-7433	1020 001
6268	1129 001	6964	1068 002	7438	1013 002
6289	1114 001	6965	1068 002	7464	1155 002
6302	1118 002	6966	1068 002	7465	1155 002
6306	1142 001	6970	1101 001	7466	1155 003
N-6346	1032 004	N-6994	1121 001	N-7467	1155 004
6376	1039 006	6996	1136 001	7470	1116 001
6410	1073 001	7000	1080 003	7473	1155 005
6411	1152 001	7004	1115 001	7474	1155 006
6412	1152 002	7034	1045 001	7475	1155 006
N-6413	1152 003	N-7036	1004 001	N-7500	1039 007
6416	1167 001	7045	1030 001	7518	1063 002
6417	1152 004	7047	1141 002	7528	1066 002
6444	1018 001	7053	1086 001	7529	1066 001
6502	1054 001	7065	1007 001	7531	1089 003
N-6530	1037 001	N-7066	1061 001	N-7531	1089 003
6531	1015 001	7114	1096 001	7534	1063 001
6587	1167 001	7115	1099 001	7535	1063 002
6610	1080 001	7120	1136 001	7536	1063 002
6655	1150 001	7127	1004 001	7540	1145 001
N-6657	1108 001	N-7132	1068 001	N-7560	1083 005
6692	1126 001	7133	1068 001	7613	1093 001
6741	1028 001	7134	1068 001	7614	1026 001
6768	1141 001	7174	1004 001	7635	1063 001
6769	1166 002	7186	1094 001	7636	1063 002
N-6775	1115 001	N-7203	1135 001	N-7637	1063 002
6780	1109 001	7244	1032 005	7664	1119 001
6806	1036 001	7277	1005 002	7745	1084 001
6858	1126 001	7327	1153 002	7769	1160 001
6860	1046 001	7328	1153 003	7770	1081 001

Table 10-4.--Instructions for coding the nine hydrogeology cards.

List C.--Well-field number codes for Nassau County Nonpublic-Water-Supply Areas (continued).

Well Number	Well Field Code	Well Number	Well Field Code	Well Number	Well Field Code
N-7798	1156 001	N-8287	1075 004	N-8774	1105 006
7799	1053 001	8288	1075 004	8775	1105 007
7830	1097 001	8289	1075 004	8799	1164 001
7834	1059 002	9290	1075 004	8807	1023 001
7846	1165 001	8291	1075 004	8816	1063 002
N-7847	1020 001	N-8292	1075 004	N-8821	1149 001
7858	1147 001	8293	1075 004	8830	1016 001
7865	1155 007	8294	1075 004	8842	1063 001
7866	1155 008	8295	1075 004	8880	1015 001
7867	1155 009	8358	1091 001	8881	1118 001
N-7914	1017 001	N-8414	1075 001	N-8882	1118 003
8008	1067 001	8432	1090 001	8885	1107 002
8038	1079 001	8433	1007 001	8887	1134 001
8050	1012 001	8454	1063 002	8896	1161 001
8095	1032 006	8458	1123 001	8932	1160 001
N-8096	1032 006	N-8481	1105 001	N-8937	1089 001
8123	1064 001	8482	1105 002	8997	1159 002
8124	1063 001	8483	1105 003	9020	1039 008
8129	1007 001	8487	1155 010	9021	1039 008
8136	1154 001	8514	1067 003	9023	1113 001
N-8153	1021 001	N-8522	1151 001	N-9030	1039 009
8154	1063 001	8534	1080 002	9049	1159 001
8162	1021 002	8542	1099 002	9050	1159 001
8167	1161 002	8601	1043 002	9051	1159 001
8171	1067 002	8608	1032 006	9052	1159 001
N-8181	1106 001	N-8624	1032 005	N-9065	1007 001
8205	1029 001	8626	1105 004	9097	1022 001
8211	1011 001	8627	1105 005	9310	1082 001
8224	1112 001	8642	1060 002	9311	1082 001
8228	1157 001	8643	1063 002	9095	1146 001
N-8246	1127 001	N-8666	1082		
8277	1089 004	8668	1108 002		
8284	1075 004	8681	1025 001		
8285	1075 004	8751	1161 002		
8286	1075 004	8761	1103 001		

Table 10-4.--Instructions for coding the nine hydrogeology cards (continued).

List D.--Lithology of screened zone.

Adjective Code (Columns 42 and 43)

1. very fine grained
2. fine grained
3. medium grained
4. coarse grained
5. very coarse grained
6. clayey
7. silty
8. sandy
9. gravelly
10. cavernous
11. argillaceous
12. bouldery
13. calcareous
14. dense
15. concretionary
16. iron stained or iron cemented
17. granular
18. hard
19. interbedded
20. joined or fractured
21. columnar
22. laminated or banded
23. massive
24. noncalcareous
25. organic
26. poorly sorted
27. cherty or siliceous
28. redbed
29. soft
30. "salt and pepper"
31. unconsolidated
32. semiconsolidated
33. well sorted
34. cross bedded
35. shaly or slaty
36. weathered

Lithology Code (Column 44)

A. alluvium
B. sedimentary rock, unclassified
C. conglomerate
D. dolomite
E. gypsum or anhydrite
F. shale
G. gravel
H. igneous, granular (granite, gabbro, etc.)
I. igneous, aphanitic or glassy (basalt, etc.)
J. igneous, unconsolidated (tuff, volcanic ash)
K. saprolite
L. limestone
M. marl or shell marl
N. metamorphic, coarse grained (gneiss, marble, quartzite)
O. metamorphic, fine grained (slate, schist)
P. clay
Q. silt or loess
R. sand and gravel
S. sand
T. till
U. unconsolidated sediments
V. sandstone
W. siltstone
X. other
Y. clayey gravel
Z. silty sand

Table 10-4.--Instructions for coding the nine hydrogeology cards (continued).

List E.--Driller codes.

Name	License Number	Name	License Number
Sweeney & Gray Co., Inc.	3	Maurice Casola	241
Artesian Well & Equipment Co., Inc.	4	John W. Krug	264
Layne-New York Company, Inc.	5	William Zuchowski	326
Zeidler Bros.	9	Lester Bedell	397
Kreiger Well & Pump Corp.	10	Walter Maus	412
The Lauman Company, Inc.	13	Sipperly Artesian Well Co., Inc.	419
Sprofera Bros.	18	Hygrade Engineering Co.	425
Kraics & Son	19	Zara Contracting Co., Inc.	426
Seitz & Wilson Well Drillers, Inc.	25	Moretrench American Corporation	440
Nugent & Potter, Inc.	29	Joseph E. Piser	448
Frederick Bach & Sons	39	Charles J. Osburg	458
John R. Miller	44	Herbert Ashen d/b/a Homewell Sprinkler Co.	472
East Coast Well Drilling & Supply Co., Inc.	52	Franklyn J. Born	480
The Suburban Engineering Company	67	J. George Werle	482
Harry A. Watson	68	Diamond Wells	484
Fred Lucas, Jr.	72	M. L. Zinna, Inc.	530
C. P. Tuthill, Inc.	80	Gillette Plumbing & Heating	536
Walter L. Dohm	105	William T. Mahoney	550
Schellinger Well Drilling, Inc.	109	Eugene Burgan	555
Frank D. Curley	113	Fred Habenicht, Jr.	559
Donald W. Scott d/b/a/ Walter F. Scott	140	Griffin Wellpoint Corp.	570
Willy R. Wettengel	147	Newton J. Throne	571
Frank Baron	149	William J. E. Smith	574
Mathies Well & Pump Co.	153	Raymond Lucas	575
Ziminski, Inc.	168	Harry Schaffer	579
Eugene Geoghan d/b/a J. J. Geoghan & Sons	189	Active Wells, Inc.	582
Mike Stiriz	204	R & L Plumbing & Well Drilling	586
Rinbrand Well Drilling Co., Inc.	215	Aqua-Mist Irrigation Co., Inc.	587
Costello Plumbing & Heating	218	FHS Well Drilling	588
Marfino & Son	228	Spearin, Preston & Burrows, Inc.	594

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List E.--Driller codes.--continued

Name	License Number	Name	License Number
B & J Gholson	614	F & F Contracting Corp.	775
Soil Mechanics Corp.	622	John Sweeney & Sons	776
Ronkonkoma Well Drillers, Inc.	638	Soviero Bros. Contracting Corp.	777
Walter T. Job Plumbing & Heating	642	Arthur E. Riker	794
Bruce Gordon	643	North Fork Oil Heat (Fred and/or Arthur F. Siemerling)	797
King's Hardware	645		
Knute Bysheim	650	R. Peter Phillips	800
Allerton Construction Corp.	656	Donald E. McCaw, Jr.	804
John A. Champlin	661	John Soltysik	808
United Well & Pump Corp.	666	Mars Associates, Inc. & Normel Construction Corp.	813
George J. Ellis	667	Frank Silvani	816
Gerardus De Mey	677		
Robert Casola	678	Caristo Construction Corp.	838
W. T. Tooker, Inc.	684	John P. Picone, Inc.	839
Ralph Tomasetti and Co.	686	Jack H. Hofmann	847
J. C. Fister Plumbing & Heating Corp.	706	Mattituck Plumbing & Heating Corp.	864
George O. Duncan	711	Noel Staker	865
Freeport Plumbing & Heating Corp.	713	Solomon Eugene Bates	866
Walter Thornberg	723	Charles L. O'Connor & Sons	873
Hank Lake (Bohemia Utilities)	728	Richard Hunsucker d/b/a North Shore Well Drillers	879
Lizza & Sons, Inc.	735	Ronald E. Brooks	890
Hinsch Contracting, Inc.	749	Applied Contracting Co., Inc.	894
Edwin F. Usher & Son	751	Robert E. Mistler	896
Leo Damboise	753	Long Island Well Drillers, Inc.	897
Ace Hoeffner Contracting Co., Inc.	757	Water Exploration & Development Corp.	900
Carl H. King	761	Arthur H. Johnson	901
J. Lanni Plumbing & Heating Co., Inc.	762	Tony Norklun	910
George J. Berry	763		
Henry J. Smith & Son, Inc.	764		
G. F. Schiavoni, Inc.	769		

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List E.--Driller codes.--continued

Name	License Number	Name	License Number
Neptune Well & Pump Company	914	Arnold J. Kazdin	1207
Walter W. Lehmann	923	Charles A. Lo Re	1210
Nicholas Divone	950	Christoper William Staker	1211
Thomas F. Sullivan	951	Charles Kirsner	1213
John Lucas d/b/a Lucas Swimming Pool Service, Inc.	960	Robert Seidenschwarz	1218
Joseph Musumeci	961	Ronald P. Moore Plumbing & Heating	1230
Leo Rauch	965	Sprinklers Unlimited, Inc.	1231
Ben Markowitz	966	Michael Dawson	1244
Jack Blattberg	968	Davis Construction Corp.	1246
Jimmy Throne	976	Arthur W. Christensen	1248
John R. Egan, Jr.	986	Robert J. Fleming	1249
Britelite Electric, Plumbing & Heating Co., Inc.	996	Peter Swezey	1254
Strata Well Corp.	1000	Alex V. Wagner d/b/a Ace Well Drilling Co.	1257
Mastic Lumber Company	1002	Naclerio Contracting Co., Inc.	1262
Walter Miller	1007	Michael K. Jacobi	1269
North Sea Plumbing & Heating	1009	Roland Steffers	1271
Thomas F. Cash & Sons, Inc.	1016	Denis Nankervis	1280
Larry Resner & Laurence Well & Pump Co., Inc.	1020	Gregory Gordon	1285
Douglas D. Weaving	1025	Harold McMahon, Inc.	1286
Dee Well Diggers	1056	Jack Ray Davis	1288
Vincent Liantonio	1061	Patrick Carrig	1289
George Besold	1082	Lemmens Landscape Co.	1292
Eugene A. Silva	1084	Robert Brown	1293
Muncy Excavating & Grading Corp.	1086	Long Island Lighting Co.	1296
Brentwood Well Drillers	1098	David W. Knight	1297
Roy Wentisch	1115	Delta Well Co., Inc.	1299
American Drilling Co.	1118	Donald Duschere	1300
Edward S. Biedrzycki	1120	John J. Jost	1301
A. Louis Tengzelius	1126	J. D. Posillico, Inc.	1302
Hans C. Floege	1134	Rudolph Rybak, Sr.	1306
Joseph Thomas Lind	1149	Allan W. Ianell	1311
Angelo L. DiVito	1150	John F. Jayne	1313
John P. Carroll Plumbing & Heating	1155	Henry Arthur Charlton	1316
Edward Becker Wells & Pumps	1195	Milton Wuischpard	1317
William J. Graham	1205	Julian J. Misiurski, Jr.	1321

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List E.--Driller codes.--continued

Name	License Number	Name	License Number
Curtis C. Meichner	1325	William G. Field	1401
Salvatore Musumeci	1326	Marian Stys	1402
Christian Haeberle d/b/a Shirley Plumbers	1328	William Albert Clark	1404
Thomas DeSalvo	1338	Arthur P. Foster (Custom Cesspools, Inc.)	1405
Lizza Industries, Inc.	1341	William Fleming	1406
Bancker Construction Corp.	1343	Fred Adler	1407
Barton R. Burlison, Jr.	1353	Irwin T. Meyers (NCDPW)[1]	1408
Bruce A. Kahler	1357	Paul Musumeci	1409
Gibson & Cushman Dredging Corp.	1359	Peter D'Alessandro	1410
Siegfried Schreiner	1361	Tallman Constructors	1411
		Vladimir Pivovonsky	1412
Walter J. Spaeth (Homeowners Service)	1362	Spencer Brown	1413
Alf Hoffmann	1364	Winchester Construction, Inc.	1414
Rudi Schlierholz	1369	Benjamin W. Lupia, Jr.	1415
Horn Construction Co., Inc.	1372	Roger Peter Maybee	1416
Harry Goldman	1373		
		William Jacobsen (Bill Jacobsen Plumbing)	1417
Nicholas Felicione	1376	Robert A. Mensel	1418
Smith Point Construction Co., Inc.	1380	A. C. Schultes & Sons, Inc.	1419
Stanley C. Mickaliger	1381	John F. Hartung	1420
John Gilbert Kramer, Jr.	1382	Stephen J. Perricone	1421
H. T. Schneider Associates	1384	John S. Mohr	1422
		Joseph W. Petrauskas	1423
Riverhead Cement Block Co., Inc.	1385	Robert E. Burden	1424
Vic Dassa	1388	Frederick J. Charnews	1425
Henry Ludlow	1389	Michael A. Wallach (Warren George, Inc.)	1426
Steven R. Lucas	1392		
Bryant L. Tabor	1393	Gene Levy Trucking, Inc.	1427
		Charles C. Watts, Jr.	1428
Kenneth Smith	1395	Edward F. Schiller	1429
Columbia Asphalt Corp.	1396	George G. Trigg	1430
George Michelis	1398	Donald D. Scarlato	1431
Crow-Crimmins-Wolff & Munier	1399		
R. T. Sewer Project Corp.	1400	Ross Winters, Inc.	1432
		Andrew E. Goodale	1433

[1]/Nassau County Department of Public Works

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List F.--Census-tract codes

Not available; to be supplied.

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List G.--School-District Codes.

School District	Code	School District	Code
		A. NASSAU COUNTY	
Amityville	014	Malverne	366
Baldwin	032	Manhasset	368
Bellmore	046	Massapequa	379
Bellmore-Merrick CHS	*	Merrick	389
Bethpage	052	Mineola	398
Carle Place	088	New Hyde Park (Garden City Park)	425
Cold Spring Harbor	123	North Bellmore	441
East Meadow	162	North Merrick	444
East Rockaway	166	North Shore (Sea Cliff)	448
East Williston	168	Oceanside	459
Elmont	184	Oyster Bay (East Norwich)	476
Farmingdale	191	Plainedge	501
Floral Park (Bellerose)	195	Plainview (Old Bethpage)	502
Franklin Square	204	Port Washington	511
Freeport	207	Rockville Centre	539
Garden City	214	Roosevelt	544
Glen Cove	224	Roslyn	546
Great Neck	234	Seaford	577
Hempstead	265	Sewanhaka	*
Herricks	270	Syosset	630
Hewlett Woodmere	272	Uniondale	652
Hicksville	273	Valley Stream CHS	*
Island Park	302	Valley Stream Hempstead-24	656
Island Trees	303	Valley Stream Hempstead-30	657
Jericho	311	Valley Stream Hempstead-13	655
Lawrence	337	Wantagh	664
Levittown	340	West Hempstead	687
Locust Valley	352	Westbury	691
Long Beach	353		
Lynbrook	357		
		B. NEW YORK CITY	
Brooklyn (Kings County)	071	Queens	519

*Use the code number for the elementary school district instead.

Table 10-4.--Instructions for coding the nine hydrogeology cards.--continued.

List G.--School District Codes (continued)

School District	Code	School District	Code
		C. SUFFOLK COUNTY	
Amagansett	013	Mattituck (Cutchogue)	382
Amityville	014	Middle Country	391
Babylon	030	Middle Island	392
Bay Shore	038	Miller Place	397
Bayport Blue Point	039	Montauk	404
Brentwood	059	Mount Sinai	414
Bridghampton	062	New Suffolk	429
Center Moriches	096	North Babylon	440
Central Islip	097	Northport (East Northport)	452
Cold Spring Harbor	123	Oyster Ponds	477
Commack	125	Patchogue (Medford)	481
Comsewogue (Brookhaven)	126	Port Jefferson	509
Connetquot (Islip)	127	Quogue	521
Copiague	130	Remsenburg (Speonk)	529
Deer Park	142	Riverhead	537
East Hampton	159	Rocky Point	540
East Islip	161	Sachem (Holbrook)	553
East Moriches	163	Sag Harbor	554
East Quogue	164	Sagaponack	555
Eastport	170	Sayville	566
Elwood	186	Shelter Island	580
Farmingdale	191	Shoreham-Wading River	585
Fire Island (Ocean Beach)	193	Smithtown	590
Fishers Island	194	South Country (Bellport)	596
Greenport	239	South Haven	598
Half Hollow Hills	250	South Huntington	599
Hampton Bays	255	South Manor	603
Harborfields	258	Southampton	608
Hauppauge	264	Southold	610
Huntington	292	Springs	617
Islip	304	Three Village	635
Kings Park	321	Tuckahoe Common (Southampton)	645
Laurel	335	Wainscott	661
Lindenhurst	344	West Babylon	684
Mastic Beach (William Floyd)	381	West Islip	688
		West Manor (Manorville)	718
		Westhampton Beach	693
		Wyandanch	712

Table 10-4.--Instructions for coding the nine hydrogeology cards.

List H.--Stream-basin codes.

Not available; to be supplied.

List I.--Codes for persons responsible for making pumping tests.

Not available; to be supplied.

SECTION 11

PROGRAMMER'S REFERENCE MANUAL FOR THE HYDROGEOLOGY SUBFILE

By

George W. Hawkins

and

Gregory M. Terlecki

CONTENTS

TABLES

INTRODUCTION

This section describes the internal structure and programming methods used within the hydrogeology subfile of the well data base. It includes the names and functions of the various files, labeled COMMON blocks, and program variables. The purpose of this section is to provide a reference for FORTRAN programmers who wish to write and implement their own retrieval or application programs.

The reader is assumed to be familiar with the FORTRAN programming language, operating under Data General's Real Time Disk Operating System (RDOS), and to be familiar with all other pertinent sections herein that describe the programs and files of the well-header file and hydrogeology subfile.

This section, when used in conjunction with section 9, "Programmer's Reference Manual for the Water-Level Subfile," will allow the programmer to create a program that retrieves from both files.

PROGRAM VARIABLES AND COMMON BLOCKS

Hydrogeology subfile data are returned in various labeled COMMON blocks in much the same way as the data are retrieved from the well-header file. Three groups of COMMON blocks are associated with each record. Primary blocks receive the data when the tape is read and are the only blocks necessary for writing an applications program. When the file is merged, the other two groups of blocks are used. Auxiliary blocks contain the update or input data, and "write" blocks are where the data are placed by the merge program before they are written back onto tape.

The various blocks and variables are described in table 11-1.

Table 11-1.--Description of variables in hydrogeology COMMON blocks.

A. L.W.S. NUMBER BLOCKS HYLWS (PRIMARY), AHYLWS (AUXILIARY), AND BHYLWS (WRITE).

Primary	Auxiliary	Write	Contents
WELLHY	XWELLHY	YWELLHY	Numeric part of local well number.
ISUFHY	JSUFHY	KSUFHY	Suffix of L.W.S. number.

B. PHYSICAL RECORDS AVAILABLE BLOCKS HYRA (PRIMARY), AHYRA (AUXILIARY), AND BHYRA (WRITE).

IRYRHY	JRYRHY	KRYRHY	Array dimensioned to 16 to hold the four-digit physical-records-available years (zero filled).
IRSMHY	JRSMHY	KRSMHY	Array dimensioned to 16 to hold the physical-records-available symbols in A1 format to print before each year (blank filled).

C. HEADING INFORMATION BLOCK H2CARD (PRIMARY).

Name	Variable contains	Variable type and length	Range
IHWROWN	Well owner's name	8A2	anything
IHOWN	Owner's well number	3A2	anything
IHOWNSIP	Ownership of well	A1	Between 1 & 8
IHWTUSE	Use of water	A1	Between 1 & 9, A or X
IHPWSA	Public water-supply area	I4	not negative
IHNP	Nonpublic-supply area	I4	not negative
IHFIELD	Well-field number	I3	not negative
HLIWR	LIWA number (Long Island)	F5.0	not negative
HWSA	WSA number (N.Y. State)	F5.0	not negative

Note: "Not negative" test is asking whether variable is greater than or equal to zero. Remember that blank spaces are read as zero in "I" and "F" formats; therefore blanks are acceptable in these checks.

Table 11-1.--Description of variables in hydrogeology COMMON blocks. (continued)

D. HEADING INFORMATION BLOCK H3CARD (PRIMARY).

Name	Variable contains	Variable type and length	Range
IHDEPTH	Depth of well or test hole	I4	0-2000
IHACC	Method depth determined	A1	1 or 2
IHCASDIA	Casing diameter, inches	I2	0-99
IHCASLTR	Casing diameter, letter	A1	A, B, C or D
IHFINISH	Finish	A1	1-5, or X
IHSCRDIA	Screen diameter, inches	I2	0-99
IHSCRLTR	Screen diameter, letter	A1	A, B, C or D
IHLNSCR	Length of screened intervals	I3	0-999
IHSURGEO	Surficial geology	A1	1-5, or X
ILITHA	Lithology adjective	I2	0-36
ILITH	Lithology type	A1	A-Z
IHDRLER	Driller	I4	0-9999
IHMTDRL	Method drilled	A1	1-9, or X
IHDCYR	Date completed, year	I2	0-99
IHDCMN	Date completed, month	I2	0-12
HCENSUS	Census tract	F6.0	no check
IHSCHOL	School district	I3	no check
IHBASIN	Stream basin	I3	no check

Table 11-1.--Description of variables in hydrogeology COMMON blocks. (continued)

E. HEADING INFORMATION BLOCK H4CARD (PRIMARY).

Name	Variable contains	Variable type and length	Range
HMPALT	Altitude of measuring point	F5.2	0-420
HSTATWL	Original static water level	F5.2	not negative
	Date of original static W.L.:		
IHOSYR	Year	I2	0-99
IHOSMN	Month	I2	0-12
IHOSDY	Day	I2	0-31
IHLIFT	Lift type	A1	1-7, or X
IHORSE	Horsepower, numeric	I3	not negative
IHORLTR	Horsepower, letter	A1	A, B, C, or D
HYIELD	Maximum yield of pump	F5.0	not negative
IHPLOG	Primary log	A1	1-7, or X
IHSLOG	Secondary log	A1	1-7, or X
IHOTH(1)	Other logs 1 and 2	A2	1-7, or X
IHOTH(2)	Other logs 3 and 4	A2	1-7, or X
IHPERSON	Person correlating top of aquifer	5A2	no check
IHRELIA	Reliability of correlation	A1	no check

Note: "Not negative" test is asking whether variable is greater than or equal to zero. Remember that blank spaces are read as zero in "I" and "F" formats; therefore blanks are acceptable in these checks.

Table 11-1.--Description of variables in hydrogeology COMMON blocks. (continued)

F. HEADING INFORMATION BLOCK H5CARD (PRIMARY).

Name	Variable contains	Variable type and length	Range
IHDITCH	Ditch sample intervals	5A2	no check
IHCORE	Core sample intervals	13A2	no check

G. HYDROGEOLOGIC UNITS AND DEPTHS BLOCK H7CARD (PRIMARY).

IHUNIT(1,1)	Hydrogeologic unit 1	2A2, A1	*
IHDPTH(1)	Hydrogeologic depth 1	I4	0-2000
IHUNIT(1,2)	Hydrogeologic unit 2	2A2, A1	*
IHDPTH(2)	Hydrogeologic depth 2	I4	0-2000
.	.	.	.
.	.	.	.
.	.	.	.
IHUNIT(1,12)	Hydrogeologic unit 12	2A2, A1	*
IHDPTH(12)	Hydrogeologic depth 12	I4	0-2000

*Each of the above UNITS (1 through 12) is checked to see if they are one of the following:

a) GLCLU	e) LLYD	i) SMTN
b) GRDR	f) BCPX	j) 20CL
c) JMCO	g) PGFG	k) MMGD
d) MGTY	h) PGQF	l) RCNF

H. HISTORIC TEXT BLOCKS HYHTXT (PRIMARY), AHYHTXT (AUXILLIARY), AND BHYHTXT (WRITE).

Primary	Auxiliary	Write	Contents
IHHYLINE	JHHYLINE	KHHYLINE	Text line number.
IHHYTEXT	JHHYTEXT	KHHYTEXT	Array dimensioned to 64 to hold one line of text in 31A2, A1, 31A2, A1 format.

Table 11-1.--Description of variables in hydrogeology COMMON blocks. (continued)

I. PUBLICATION TEXT BLOCKS HYPTXT (PRIMARY), AHYPTXT (AUXILIARY), AND BHYPTXT (WRITE).

Primary	Auxiliary	Write	Contents
IPHYLINE	JPHYLINE	KPHYLINE	Text line number.
IPHYTEXT	JPHYTEXT	KPHYTEXT	Array dimensioned to 64 to hold one line of text in 31A2, A1, 31A2, A1 format.

J. PUMPING TEST BLOCK H8CARD (PRIMARY).

Name	Variable contains	Variable type and length	Range
HYIELD8	Yield during test	F5.0	not negative
IHMETH	Method yield determined	A1	1-8, or X
IHSWL	Static water level	I3	not negative
IHPWL	Pumping water level	I3	not negative
IHACCP	Accuracy	A1	1-7
IHPUMP	Pumping period, hours	I3	not negative
IHPLTR	Pumping period, letter	A1	A, B, C, or D
IHINFO	Pumping-test information available	A1	1-4
IHYLDYR	Date of pumping test - year	I2	0 to current year
IHYLDMN	month	I2	1-12
IHYLDDY	day	I2	1 to number of days in month
IHPMT	Person making pumping test	A1	no check
HSPCAP	Specific capacity	F4.1	not negative

Note: "Not negative" test is asking whether variable is greater than or equal to zero. Remember that blank spaces are read as zero in "I" and "F" formats; therefore blanks are acceptable in these checks.

RECORD FLAGS

Thirteen record flags are used between the various fixed-length records in the hydrogeology subfile. These flags indicate what type of record is next on tape and are used to control the subroutines that are reading the records from tape. A description of the flags is given in table 11-2.

All subroutines that are used to read data from tape return an error flag. If the data next on tape are the kind that the subroutine is capable of reading, the data are read, and the error flag is set to the record flag of the data that were read. If the data are not the kind that the subroutine can read, the error flag is set to the record flag of the next kind of data on tape.

Table 11-2.--Description of record flags in hydrogeology subfile.

Record-flag number	Purpose
1	Indicates beginning of a new well on tape (and the end of the previous well). This flag precedes the L.W.S. number of the well (county letter is omitted) and three levels of subfile pointers.
2	Precedes the 16 four-digit physical-records-available years and symbols but is not actually used.

Both record types 1 and 2 are present if the well is represented in the hydrogeology subfile and are read by subroutine LRPRA as one record.

3	Precedes heading record from no. 2 card. This record is always present if well is represented in the hydrogeology subfile and is read by subroutine HY2INIT.
4	Precedes heading record from no. 3 card. This record is always present if well is represented in the hydrogeology subfile and is read by subroutine HY3INIT.
5	Precedes heading record from no. 4 card. This record is always present if well is represented in the hydrogeology subfile and is read by subroutine HY4INIT.
6	Precedes heading record from no. 5 card. This record is always present if well is represented in the hydrogeology subfile and is read by subroutine HY5INIT.
7	This flag is not used and is reserved for expansion of heading by means of a no. 6 card.

Table 11-2.--Description of record flags in hydrogeology subfile (continued)

Record-flag number	Purpose
8	Precedes hydrogeologic units and depths if these are recorded in the file. This record is optional and is read by subroutine HY7INIT.
9	Precedes one line of historic text (line number and text). This record is optional and may be repeated up to 99 times.
10	Precedes one line of publication text (line number and text). This record is optional and may be repeated up to 99 times.
	Records 9 and 10 are read by subroutine LRTX.
11	Precedes each pumping-test record (if any) in a well. This record is read by subroutine HY8INIT and may repeat infinitely.
-1	Indicates the end of a Linctape.
-2	Indicates the end of the last Linctape (end of file).

RETRIEVAL FROM HYDROGEOLOGY SUBFILE

Retrieval from the hydrogeology subfile is best illustrated by a "shell" retrieval program (table 11-3). This program is simply a shell retrieval program for the well-header file with additional statements added that make it into a hydrogeology retrieval program. Retrieval of well information from the well-header file is explained in section 5, "Programmer's Reference Manual for the Well-Header File."

Once the desired L.W.S. number is obtained and the well information is retrieved from the well-header file, subroutine LTAMR is called. This is a subroutine to determine whether data for that well are available in the hydrogeology subfile and, if so, to position the Linctape to the data.

The eight tape-reading subroutines can now be used. The tape L.W.S. number and physical records available must now be read by subroutine LRPRA and the heading data must then be read by subroutines HY2INIT, HY3INIT, HY4INIT, HY5INIT, AND HY7INIT. Subroutine LRTX is then called to read a line (if any) of historic text until the last line is read, followed by the publication text in a similar manner. Finally, subroutine HY8INIT is called

to read one pumping test (if any) from tape. Note that once read, the data in the well-header file, the physical records available, and the hydrogeology heading data will be available at any time. The historic text and publication text is available only one line at a time, and only one pumping test is available at a time unless the programmer stores the test for later use.

Tape records must be read in the order in which they appear. The only backspace possible is to the beginning of the well, and unneeded data must be read and ignored to forward space. The eight tape-reading subroutines will not read the data from the tape if the data next on the tape are not the kind that the particular subroutine expects to read. Thus, the order shown in the "shell" program must be followed.

To create a new application program, the programmer need only copy file HYSHELL.FR into some other appropriately named file and use the text editor to add the required statements. After the new program has been compiled from the FORT command, the new savefile must be created. The minimum CLI command needed to create a savefile using the hydrogeology subfile shell program, assuming a program name of MAIN is:

```
RLDR MAIN RLWS HDCURW HDNAM HDGET HDCKF HLOC WECODE

WDCODE HEDOPN LRPRA HY2INIT HY3INIT HY4INIT

HY5INIT HY7INIT LRTX HY8INIT LTAMR RNLT

HDLINC LTSYS.LB UTIL.LB FORT.LB
```

Note that the above hydrogeology subfile software will usually be maintained only on the well data base program-development disk. Also, all new programs should be thoroughly tested with the test data files on that disk before applying the program on the "live" data files on other disks. Again, in a retrieval program, no "writes" should be issued on FORTRAN channels 1 or 2.

Many of the hydrogeology subfile software routines are described in table 11-4.

Table 11-3.--List of program HYSHELL.

```
C HYDROGEOLOGY SUBFILE "SHELL" RETRIEVAL PROGRAM BY L.W.S. NUMBER.
C FORTRAN CHANNELS 1, 2, AND 12 ARE IN USE BY THE WELL-HEADER FILE.
C
C WELL-HEADER FILE RECORD 0, CONTROL RECORD.
      COMMON/HEAD0/IREC0,ZERO,IRECOUNT,IC0,LEVEL(6),IHT(2,6),
     1   ILT(2,6),JDUM(151) ;186 WORDS.
C
C WELL HEADER KEY FILE, 24 BLOCKS LONG.
      COMMON/HKEYS/NKEY,ICKEY,ITBLE,IWEL(3000),IWELS(3000),IDUM(141)
C
C WELL-HEADER FILE RECORDS 1-3000, 186 WORDS.
      COMMON/HEAD/IREC,WELL,ISEQ,IRES,ICHECK,IMODYR,IMODMD,IUSE,
     1   ISTA(8),IQWSCR,RLAT,RLONG,ITOWN,ICMTY,IDRAIN,IPAREA,
     2   RSPARE,IUNIT(4),ALT,ISCRTOP,ISCRBOT,ICPR,WELLPR,ISEQPR,
     3   ICFU,WELLFU,ISEQFU,ITIME,ISPARE(15),IFILE(4,6),ISITE(34,3)
```

Table 11-3.--List of program HYSHELL (continued).

```
C
C "PRIMARY" HYDROGEOLOGY SUBFILE COMMON BLOCKS. (LINC TAPE DATA)
C PHYSICAL RECORDS AVAILABLE.  YEAR,SYMBOL
      COMMON/HYRA/IRYRHY(16),IRSMHY(16)
C L.W.S. NUMBER.  WELL,SUFFIX
      COMMON/HYLWS/WELLHY,ISUFHY
C PUBLICATION TEXT.  LINE NUMBER, TEXT.
      COMMON/HYPTXT/IPHYLINE,IPHYTEXT(64)
C HISTORIC TEXT.  LINE NUMBER, TEXT.
      COMMON/HYHTXT/IHHYLINE,IHHYTEXT(64)
C #2 HYDROGEOLOGY CARD
      COMMON/H2CARD/IHWROWN(8),IHOWN(3),IHOWNSIP,IHWTUSE,IHPWSA,
     X    IHNP,IHFIELD,HLIWR,HWSA
C #3 HYDROGEOLOGY CARD
     COMMON/H3CARD/IHDEPTH,IHACC,IHCASDIA,IHCASLTR,IHFINISH,IHSCRDIA,
     X    IHSCRLTR,IHLNSCR,IHSURGEO,ILITHA,ILITH,IHDRLER,IHMTDRL,
     X    IHDCYR,IHDCMN,HCENSUS,IHSCHOL,IHBASIN
C #4 HYDROGEOLOGY CARD
      COMMON/H4CARD/HMPALT,HSTATWL,IHOSYR,IHOSMN,IHOSDY,IHLIFT,
     X    IHORSE,IHORLTR,HYIELD,IHPLOG,IHSLOG,IHOTH(2),
     X    IHPERSON(5),IHRELIA
C #5 HYDROGEOLOGY CARD
      COMMON/H5CARD/IHDITCH(5),IHCORE(13)
C #7 HYDROGEOLOGY CARD
      COMMON/H7CARD/IHUNIT(3,12),IHDPTH(12)
C #8 HYDROGEOLOGY CARD
      COMMON/H8CARD/HYIELD8,IHMETH,IHSWL,IHPWL,IHACCP,IHPUMP,IHPLTR,
     X    IHINFO,IHYLDYR,IHYLDMN,IHYLDDY,IHPMT, HSPCAP
C
C
      KOUNT=0
      CALL HDNAM
C
C USER INITIALIZATION CODE GOES HERE.
C
C MAIN RETRIEVAL LOOP.
1     CALL RLWS(IC,WELLNO,JSEQ)
      IF(WELLNO.LE.0.)GO TO 100
C GET WELL FROM HEADER FILE
      CALL HDGET(IC,WELLNO,JSEQ,IER)
      IF(IER)1,3,2
C POSITION LINCTAPE (MAYBE) TO WELL IF IT EXISTS
2     CALL LTAMR(3,IERF)
      IF(IERF.NE.1)GO TO 5
C
C READ HY PHYSICAL RECORDS AVAILABLE
      CALL LRPRA(3,WELLHY,ISUFHY,IRYRHY,IRSMHY,IERF)
      IF(IERF.EQ.1)GO TO 10
      TYPE 'ERROR AT 1, IERF=',IERF
      PAUSE
```

Table 11-3.--List of program HYSHELL (continued).

```
C
10      IF(WELL.EQ.WELLHY.AND.ISEQ.EQ.ISUFHY)GO TO 11
        WRITE(10,12)ICO,WELL,ISEQ,ICO,WELLHY,ISUFHY
12      FORMAT(1X,'SUBFILE RETRIEVAL ERROR; LWS FROM SUBFILE NOT EQUAL ',
     1'LWS FROM HEADER FILE.'/5X,'HEADER WELL=',A1,F7.0,12,
     25X,'HYDROGEOLOGY WELL=',A1,F7.0,I2)
        PAUSE
C
C
C PHYSICAL RECORDS AVAILABLE AND LWS READ FROM TAPE ARE
C AVAILABLE FROM THIS POINT ON (COMMON BLOCK HYLWS AND HYRA)
11      CONTINUE
C
C
C READ HEADING
        CALL HY2INIT(3,IERF,0)
        IF(IERF.NE.3)TYPE 'IERF=',IERF
        CALL HY3INIT(3,IERF,0)
        IF(IERF.NE.4)TYPE 'IERF=',IERF
        CALL HY4INIT(3,IERF,0)
        IF(IERF.NE.5)TYPE 'IERF=',IERF
        CALL HY5INIT(3,IERF,0)
        IF(IERF.NE.6)TYPE 'IERF=',IERF
        CALL HY7INIT(3,NUNITS,IERF)
C
C
C HEADING IS AVAILABLE FROM THIS POINT ON (COMMON BLOCKS H(2,3,4,5,7)CARD)
C "NUNITS" IS THE NUMBER OF HYDROGEOLOGIC UNITS IN COMMON BLOCK H7CARD,
C WHICH COULD BE ZERO.
C
C
C READ HISTORIC TEXT
20      CALL LRTX(3,'H ',IHHYLINE,IHHYTEXT,IERF)
        IF(IERF.NE.9)GO TO 35
C
C
C ONE LINE OF HISTORIC TEST MAY BE AVAILABLE HERE (COMMON BLOCK HYHTXT)
C
C
        GO TO 20
C
C READ PUBLICATION TEST
35      CALL LRTX(3,'P',IPHYLINE,IPHYTEXT,IERF)
        IF(IERF.NE.10)GO TO 45
C
C
C ONE LINE OF PUBLICATION TEXT MAY BE AVAILABLE HERE (COMMON BLOCK HYPTXT).
C
C
        GO TO 35
```

Table 11-3.--List of program HYSHELL (continued).

```
C
C READ A PUMPING TEST
45      CALL HY8INIT(3,IERF)
        IF(IERF.NE.11)GO TO 50
C
C
C ONE PUMPING TEST MAY BE AVAILABLE HERE (COMMON BLOCK H8CARD)
C
C
        GO TO 45
C
50      KOUNT=KOUNT+1
        GO TO 1
C WELL NOT FOUND.
3       WRITE(10,4)IC,WELLNO,JSEQ
4       FORMAT(1X,'WELL ',A1,F7.0,I2,' NOT FOUND.')
        GO TO 1
C NO HYDROGEOLOGY DATA.
5       WRITE(10,6)IC,WELLNO,JSEQ
6       FORMAT(1X,'NO HYDROGEOLOGY INFORMATION ON FILE FOR WELL ',A1,F7.0,I2)
        GO TO 1
C END.
100     WRITE(10,7)KOUNT
7       FORMAT(1X,I5,' WELLS HAVE BEEN RETRIEVED AND PROCESSED.')
C
C USER END OF PROGRAM CODE GOES HERE.
C
        CALL RESET
        CALL BACK
        END
```

SEQUENTIAL RETRIEVAL FROM THE HYDROGEOLOGY SUBFILE

Well records stored on tape may be read sequentially if needed. The easiest way to begin the program is to randomly retrieve the data for the starting well. Then, at the end of that well, go back to subroutine LRPRA, which will begin to read the next well. This method does not obtain the record from the well-header file because the call to HDGET will be bypassed, but this can easily be moved if needed. If it is not moved, the L.W.S. number used for any purpose must be the one in labeled COMMON block HYLWS because data in the COMMON blocks from the header file will not change, and neither will the variables returned from subroutine RLWS. Also, the programmer must terminate the program (statement 100) if subroutine LRPRA returns an error code of -2 (end of last tape); otherwise the program will go into a loop after the last well is read from tape.

Table 11-4.--Hydrogeology subfile software descriptions.

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Table 11-4.--Hydrogeology subfile software descriptions.

Program: HDSF

LANGUAGE: FORTRAN
AUTHORS: GH GT
PROJECT: WELL DATA BASE SUBFILES
LINCFILE: HDSF

THIS FILE CONTAINS THE VARIOUS BLOCKS OF LABELED COMMON USED IN MANY OF THE PROGRAMS WHICH ACCESS THE SUBFILES OF THE WELL DATA BASE. THUS THIS FILE CAN BE USED TO OBTAIN THE COMMON BLOCKS WITHOUT HAVING TO TYPE THEM OR FIND A PROGRAM TO TAKE THEM FROM.

Program: HYSHELL (Hydrogeology Subfile Shell)

LANGUAGE: FORTRAN
AUTHOR: GH
PROJECT: HYDROGEOLOGY SUBFILE
LINCFILE: HYSHL

THIS IS A SHELL RETRIEVAL PROGRAM FOR RETRIEVING HYDROGEOLOGY DATA FROM THE HYDROGEOLOGY SUBFILE. IT IS BASICALLY A WELL-HEADER FILE SHELL PROGRAM WITH THE NECESSARY STATEMENTS ADDED TO MAKE IT INTO A HYDROGEOLOGY SHELL RETRIEVAL PROGRAM. ALTHOUGH THIS PROGRAM WILL FIT WITH THE "DEFAULT RDOS" SYSTEM, ANY PROGRAM CREATED FROM THIS PROGRAM WILL PROBABLY REQUIRE THE SMALL RDOS SYSTEM OR CONVERSION TO USE INDEX TABLES DIRECTLY FROM DISK.

SUBROUTINES REQUIRED: RLWS, HDCURW, HDNAM, HDGET, HDCKF, HLOC, WECODE, WDCODE, HEDOPN, LRPRA, HY2INIT, HY3INIT, HY4INIT, HY5INIT, HY7INIT, LRTX, HY8INIT, LTAMR, RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB, UTIL.LB.
DISK DATA FILES REQUIRED: HDNAMES AND AT LEAST ONE COUNTY OF THE WELL-HEADER FILE.

Program: WLHYSHELL (WL HY Shell)

LANGUAGE: FORTRAN
AUTHOR: GH
PROJECT: WL AND HY SUBFILES
LINCFILE: WLHYSH

THIS IS A SHELL RETRIEVAL PROGRAM FOR RETRIEVING BOTH HYDROGEOLOGY AND WATER-LEVEL DATA FROM THE HYDROGEOLOGY AND WATER-LEVEL SUBFILES OF THE WELL DATA BASE. IT IS BASICALLY A WELL-HEADER FILE SHELL PROGRAM WITH THE NECESSARY STATEMENTS ADDED TO MAKE IT INTO A WATER-LEVEL AND HYDROGEOLOGY SHELL RETRIEVAL PROGRAM. CURRENTLY, RETRIEVAL FROM THE HYDROGEOLOGY SUBFILE IS ATTEMPTED FIRST. IF THE WELL IS NOT FOUND, THE NEXT WELL IS RETRIEVED FROM THE HEADER FILE. IF THE WELL IS FOUND IN THE HYDROGEOLOGY FILE, AN ATTEMPT IS MADE TO RETRIEVE FROM THE WATER-LEVEL FILE. IF THE WELL IS NOT FOUND, THE NEXT WELL IS RETRIEVED FROM THE HEADER FILE. THIS MAY OR MAY NOT BE THE DESIRED OPERATION OF THE RETRIEVAL PROCESS. PERHAPS AN "OR" INSTEAD OF AN "AND" RETRIEVAL MAY BE DESIRED, IN WHICH CASE THE VARIABLES IN THE HYDROGEOLOGY AND/OR WATER-LEVEL FILE COMMON BLOCKS MUST BE INITIALIZED IF THE WELL IS NOT FOUND.

SUBROUTINES REQUIRED: RLWS, HDCURW, HDNAM, HDGET, HDCKF, HLOC, WECODE, WDCODE, HEDOPN, LRPRA, HY2INIT, HY3INIT, HY4INIT, HY5INIT, HY7INIT, LRTX, HY8INIT, LRHDWL, LRWL, LTAMR, RNLT, JDAY, HDLINC.

Table 11-4.--Hydrogeology subfile software descriptions (continued).

LIBRARIES REQUIRED: LTSYS.LB, UTIL.LB.
DISK DATA FILES REQUIRED: HDNAMES AND AT LEAST ONE COUNTY OF THE WELL-HEADER FILE.

Subroutine: JDAY (Julianized Date)

LANGUAGE: FORTRAN PROJECT: GENERAL
AUTHOR: GH LINCFILE: JDAY

THIS SUBROUTINE CALCULATES THE RELATIVE DAY NUMBER WITHIN A YEAR FROM A DATE EXPRESSED AS MONTH, DAY, AND YEAR AND CAN ALSO PERFORM THE REVERSE CONVERSION. THE YEAR MUST BE SUPPLIED SO THAT THE SUBROUTINE CAN DETERMINE WHETHER IT IS LEAP YEAR, AND THE RESULT IS RETURNED FOR USE BY THE CALLING PROGRAM. LEAP-YEAR CORRECTIONS ARE INCLUDED FOR ALL YEARS AFTER 1582. NO CHECKS ARE MADE FOR INVALID INPUT ARGUMENTS.

ARGUMENTS(IM,ID,IY,NDAY,IDIR,LEAP).
- IM - CALENDAR MONTH.
- ID - CALENDAR DAY.
- IY - CALENDAR YEAR EXPRESSED USING 4 DIGITS.
- NDAY - RELATIVE DAY NUMBER (1-365, OR 366) WITHIN "IY".
- IDIR - CONVERSION DIRECTION:
  - 0 = DECODE RELATIVE DAY NUMBER INTO MONTH AND DAY.
  - 1 = ENCODE MONTH AND DAY INTO RELATIVE DAY NUMBER.
- LEAP - LEAP YEAR INDICATOR RETURNED FROM SUBROUTINE:
  - 0 = "IY" IS NOT A LEAP YEAR.
  - 1 = "IY" IS A LEAP YEAR.

Subroutine: LRPRA (Read Physical Records Available)

LANGUAGE: FORTRAN PROJECT: WELL DATA BASE SUBFILES
AUTHOR: GH LINCFILE: LRPRA

THIS SUBROUTINE READS THE PHYSICAL RECORDS AVAILABLE FROM LINCTAPE FOR THE DESIRED SUBFILE OF THE WELL DATA BASE. IT MAY BE USED AS AN OVERLAY NAMED "VLRPRA." IF THIS IS DONE, REMEMBER TO INCLUDE THE LABELED COMMON BLOCK "FLAG" IN THE MAIN PROGRAM.

ARGUMENTS(ISUBFILE,WELLX,ISUFX,IRYR,IRSM,IER).
- ISUBFILE - DESIRED SUBFILE NUMBER.
- WELLX - WELL NUMBER OF WELL READ FROM TAPE.
- ISUFX - SUFFIX NUMBER OF WELL READ FROM TAPE.
- IRYR - ARRAY DIMENSIONED TO 16 IN WHICH WILL BE PLACED THE 4-DIGIT YEARS OF THE PHYSICAL RECORDS AVAILABLE.
- IRSM - ARRAY DIMENSIONED TO 16 IN WHICH WILL BE PLACED THE PHYSICAL RECORDS AVAILABLE SYMBOLS.
- IER - ERROR INDICATOR:
  - 1 = PHYSICAL RECORDS AVAILABLE WERE READ.
  - -2 = END OF ALL TAPES.
  - >0 = TYPE OF THE NEXT KIND OF DATA ON TAPE.

SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Table 11-4.--Hydrogeology subfile software descriptions (continued).

Subroutine: HY2INIT (HY Heading 2 INIT)

LANGUAGE: FORTRAN PROJECT: HYDROGEOLOGY SUBFILE
AUTHORS: GT, GH LINCFILE: HY2INT

THIS SUBROUTINE READS THE HYDROGEOLOGY HEADING 2 DATA FOR THE HYDROGEOLOGY SUBFILE OF THE WELL DATA BASE. THE INFORMATION IS RETURNED IN THE HYDROGEOLOGY LABELED COMMON BLOCK "H2CARD."

ARGUMENTS(ISUBFILE,IER,ILZ).

ISUBFILE - SUBFILE NUMBER (SET THIS TO 3).
IER - ERROR INDICATOR:
3 = HYDROGEOLOGY HEADING 2 DATA WAS READ.
-2 = END OF LAST TAPE.
>0 = TYPE OF THE NEXT KIND OF DATA ON TAPE.
ILZ - CONTROL:
0 = READ DATA. INITIALIZE IF NOT FOUND.
1 = INITIALIZE DATA ONLY (USED IN MERGE PROGRAM).

SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Subroutine: HY3INIT (HY Heading 3 INIT)

LANGUAGE: FORTRAN PROJECT: HYDROGEOLOGY SUBFILE
AUTHORS: GT, GH LINCFILE: HY3INT

THIS SUBROUTINE READS THE HYDROGEOLOGY HEADING 3 DATA FOR THE HYDROGEOLOGY SUBFILE OF THE WELL DATA BASE. THE INFORMATION IS RETURNED IN THE HYDROGEOLOGY LABELED COMMON BLOCK "H3CARD."

ARGUMENTS(ISUBFILE,IER,ILZ).

ISUBFILE - SUBFILE NUMBER (SET THIS TO 3).
IER - ERROR INDICATOR:
4 = HYDROGEOLOGY HEADING 3 DATA WAS READ.
-2 = END OF LAST TAPE.
>0 = THE TYPE OF THE NEXT KIND OF DATA ON TAPE.
ILZ - CONTROL:
0 = READ DATA. INITIALIZE IF NOT FOUND.
1 = INITIALIZE DATA ONLY (USED IN MERGE PROGRAM).

SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Table 11-4.--Hydrogeology subfile software descriptions (continued).

Subroutine: HY4INIT (HY Heading 4 INIT)

LANGUAGE: FORTRAN PROJECT: HYDROGEOLOGY SUBFILE
AUTHORS: GT, GH LINCFILE: HY4INT

THIS SUBROUTINE READS THE HYDROGEOLOGY HEADING 4 DATA FOR THE HYDROGEOLOGY SUBFILE OF THE WELL DATA BASE. THE INFORMATION IS RETURNED IN THE HYDROGEOLOGY LABELED COMMON BLOCK "H4CARD."

ARGUMENTS(ISUBFILE,IER,ILZ).

ISUBFILE - SUBFILE NUMBER (SET THIS TO 3).
IER - ERROR INDICATOR:
5 = HYDROGEOLOGY HEADING 4 DATA WAS READ.
-2 = END OF LAST TAPE.
>0 = TYPE OF NEXT KIND OF DATA ON TAPE.
ILZ - CONTROL:
0 = READ DATA. INITIALIZE IF NOT FOUND.
1 = INITIALIZE DATA ONLY (USED IN MERGE PROGRAM).

SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Subroutine: HY5INIT (HY Heading 5 INIT)

LANGUAGE: FORTRAN PROJECT: HYDROGEOLOGY SUBFILE
AUTHORS: GT, GH LINCFILE: HY5INT

THIS SUBROUTINE READS THE HYDROGEOLOGY HEADING 5 DATA FOR THE HYDROGEOLOGY SUBFILE OF THE WELL DATA BASE. THE INFORMATION IS RETURNED IN THE HYDROGEOLOGY LABELED COMMON BLOCK "H5CARD."

ARGUMENTS(ISUBFILE,IER,ILZ).

ISUBFILE - SUBFILE NUMBER (SET THIS TO 3).
IER - ERROR INDICATOR:
6 = HYDROGEOLOGY HEADING 5 DATA WAS READ.
-2 = END OF LAST TAPE.
>0 = TYPE OF NEXT KIND OF DATA ON TAPE.
ILZ - CONTROL:
0 = READ DATA. INITIALIZE IF NOT FOUND.
1 = INITIALIZE DATA ONLY (USED IN MERGE PROGRAM).

SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Table 11-4.--Hydrogeology subfile software descriptions (continued).

Subroutine: HY7INIT (HY Heading 7 INIT)

LANGUAGE: FORTRAN PROJECT: HYDROGEOLOGY SUBFILE
AUTHORS: GT, GH LINCFILE: HY7INT

THIS SUBROUTINE READS THE HYDROGEOLOGY HEADING 7 DATA FOR THE HYDROGEOLOGY SUBFILE OF THE WELL DATA BASE. THE INFORMATION IS RETURNED IN THE HYDROGEOLOGY LABELED COMMON BLOCK "H7CARD."

ARGUMENTS(ISUBFILE,NUNITS,IER).
- ISUBFILE - SUBFILE NUMBER (SET THIS TO 3).
- NUNITS - NUMBER OF HYDROGEOLOGIC UNITS AND DEPTHS READ. THIS CAN BE FROM 0 TO 12.
- IER - ERROR INDICATOR:
  - 8 = FROM 1 TO 12 HYDROGEOLOGIC UNITS AND DEPTHS WERE READ.
  - -2 = END OF LAST TAPE.
  - >0 = TYPE OF NEXT KIND OF DATA ON TAPE.

SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Subroutine: LRTX (Read Text)

LANGUAGE: FORTRAN PROJECT: WELL DATA BASE SUBFILES
AUTHOR: GH LINCFILE: LRTX

THIS SUBROUTINE READS A LINE OF HISTORIC OR PUBLICATION TEXT FROM THE DESIRED SUBFILE OF THE WELL DATA BASE. IT MAY BE USED AS AN OVERLAY NAMED "VLRTX." IF THIS IS DONE, REMEMBER TO INCLUDE THE LABELED COMMON BLOCK "FLAG" IN THE MAIN PROGRAM.

ARGUMENTS(ISUBFILE,ITTEXT,LINE,ITEXT,IER).
- ISUBFILE - SUBFILE NUMBER.
- ITTEXT - TYPE OF TEXT DESIRED IN "A1" FORMAT:
  - "H "=HISTORIC.
  - "P "=PUBLICATION.
- LINE - LINE NUMBER OF THE LINE OF TEXT READ.
- ITEXT - ARRAY DIMENSIONED TO 64 IN WHICH WILL BE PLACED THE LINE OF TEXT READ IN "31A2,A1,31A2,A1" FORMAT.
- IER - ERROR INDICATOR:
  - 4 = A LINE OF WATER-LEVEL HISTORIC TEXT WAS READ (IF "ITTEXT" = "H ").
  - 5 = A LINE OF WATER-LEVEL PUBLICATION TEXT WAS READ (IF "ITTEXT" = "P ").
  - 9 = A LINE OF HYDROGEOLOGY HISTORIC TEXT WAS READ (IF "ITTEXT" = "H ").
  - 10 = A LINE OF HYDROGEOLOGY PUBLICATION TEXT WAS READ (IF "ITTEXT" = "P ").
  - -2 = END OF LAST TAPE.
  - >0 = TYPE OF NEXT KIND OF DATA ON TAPE.

SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Table 11-4.--Hydrogeology subfile software descriptions (continued).

Subroutine: HY8INIT (HY Heading 8 INIT)

LANGUAGE: FORTRAN PROJECT: HYDROGEOLOGY SUBFILE
AUTHORS: GT, GH LINCFILE: HY8INT

THIS SUBROUTINE READS ONE PUMPING TEST FROM THE HYDROGEOLOGY SUBFILE OF THE WELL DATA BASE. THE INFORMATION IS RETURNED IN THE HYDROGEOLOGY LABELED COMMON BLOCK "H8CARD."

ARGUMENTS(ISUBFILE,IER).
ISUBFILE - SUBFILE NUMBER (SET THIS TO 3).
IER - ERROR INDICATOR:
11 = ONE PUMPING TEST WAS READ.
-2 = END OF LAST TAPE.
>0 = TYPE OF NEXT KIND OF DATA ON TAPE.

SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Subroutine: LTAMR (Linctape Auto-Read)

LANGUAGE: FORTRAN PROJECT: WELL DATA BASE SUBFILES
AUTHOR: GH LINCFILE: LTAMR

THIS SUBROUTINE POSITIONS A LINCTAPE TO THE BEGINNING OF THE DATA FOR A WELL IN THE DESIRED SUBFILE. ALL TAPE MOUNTING MESSAGES ARE ALSO PRODUCED. IT IS ASSUMED THAT THE DESIRED WELL'S RECORD HAS ALREADY BEEN RETRIEVED FROM THE WELL-HEADER FILE.

ARGUMENTS(ISB,IERF).
ISB - DESIRED SUBFILE NUMBER.
IERF - RECORD TYPE FLAG READ FROM TAPE AFTER POSITIONING THE TAPE. A CORRECT SEARCH SHOULD RETURN A FLAG EQUAL TO 1.

SUBROUTINES REQUIRED: RNLT, HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Subroutine: RNLT (Read A New Linctape)

LANGUAGE: FORTRAN PROJECT: WELL DATA BASE SUBFILES
AUTHOR: GH LINCFILE: RNLT

THIS SUBROUTINE HANDLES TAPE CHANGES WHILE READING, AND READS THE FIRST BLOCK FROM THE TAPE, WHICH IS THE INTERNAL TAPE IDENTIFICATION. EITHER A SPECIFIC TAPE NUMBER MAY BE REQUESTED, OR THE NEXT TAPE IN SEQUENCE MAY BE REQUESTED. SEVERAL ITEMS MUST BE PROVIDED IN LABELED COMMON (COUNTY, SUBFILE, LEVEL, TAPE).

ARGUMENTS(MTAPE).
MTAPE - TAPE NUMBER DESIRED. IF SET TO ZERO, THE NEXT TAPE IN SEQUENCE WILL BE USED.

SUBROUTINES REQUIRED: HDLINC.
LIBRARIES REQUIRED: LTSYS.LB.

Table 11-4.--Hydrogeology subfile software descriptions (continued).

Subroutine: HDLINC (Header Subfile Names)

LANGUAGE: FORTRAN — PROJECT: WELL DATA BASE SUBFILES
AUTHOR: GH — LINCFILE: HDLINC

THIS SUBROUTINE GENERATES A 6-CHARACTER FILE NAME FOR USE IN REFERENCING THE SUBFILES OF THE WELL DATA BASE. THE SUBFILES ARE STORED ON EITHER LINCTAPE OR 9-TRACK MAGNETIC TAPE. UP TO 3744 NAMES MAY BE GENERATED. (6 COUNTIES X 2 TAPE TYPES X 6 SUBFILES X 2 LEVELS X 26 TAPES).

ARGUMENTS(IC,IFILE,LEVEL,ITAPE,IDTYPE,NAME).

- IC - COUNTY LETTER IN "A1" FORMAT (K, N, P, Q, S, OR W).
- IFILE - SUBFILE (1-6).
- LEVEL - LEVEL (1-2).
- ITAPE - TAPE NUMBER (1-26).
- IDTYPE - MAGNETIC TAPE DRIVE TYPE:
  - 0 = LINCTAPE
  - 1 = 9-TRACK TAPE.
- NAME - ARRAY DIMENSIONED TO 3 WHICH WILL CONTAIN THE GENERATED NAME IN "A2" FORMAT. IF "NAME" IS REPRESENTED BY 123456, CHARACTER POSITIONS ARE FILLED AS FOLLOWS:
  - 1 = COUNTY LETTER.
  - 2 = "L" FOR LINCTAPE, OR "M" FOR 9-TRACK TAPE.
  - 3 & 4 = SUBFILE NAME ("WL", "PU", "HY", "QW", "LG", OR "S1").
  - 5 = LEVEL (1=A, 2=B).
  - 6 = TAPE NUMBER (1=A, 2=B, ETC. THROUGH THE ALPHABET).

  "NAME" WILL CONTAIN "??????" IF AN INVALID COUNTY OR SUBFILE IS DETECTED. NO OTHER VALIDITY CHECKS ARE MADE.

Subroutine: SFDATA (Subfile Data Available)

LANGUAGE: FORTRAN — PROJECT: WELL DATA BASE SUBFILES
AUTHOR: GH — LINCFILE: SFDATA

THIS SUBROUTINE INDICATES WHETHER DATA FOR A WELL IS STORED IN THE CURRENT LEVEL OF A SUBFILE OF THE WELL DATA BASE. IT IS ASSUMED THAT THE DESIRED WELL'S RECORD HAS BEEN RETRIEVED FROM THE WELL-HEADER FILE BEFORE THIS SUBROUTINE IS CALLED.

ARGUMENTS(ISUBFILE,IDATA).

- ISUBFILE - SUBFILE TO TEST (1-6 ONLY).
- IDATA - RESULT OF TEST:
  - 0 = WELL DOES NOT EXIST IN SUBFILE.
  - >0 = WELL EXISTS IN SUBFILE.
