INSTRUCTIONS FOR USING THE MINNESOTA SYSTEM FOR STORAGE AND RETRIEVAL OF GEOLOGIC LOG DATA

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INTRODUCTION

Information on geologic formations has always been needed by government agencies, industries, and individuals interested in mineral and water resources. Increasing interest in these resources and in the growing environmental problems caused by underground storage of materials and waste disposal has created a need for ready access to geologic data. Several government agencies in Minnesota collect a large amount of geologic data. Until the present time each agency maintained its own file, although exchange of data has occurred often and freely. However, to avoid duplication of effort and to establish the most efficient data storage and retrieval system it was decided that the Minnesota Geological Survey would maintain the central file of geologic data for the State and that the data should be stored in a digital computer system. A printout would then be provided of whatever geologic data was requested by other agencies and individuals.

The first need in establishing a system for computer processing of geologic data is to store geologic logs on machine-readable punched cards. The purpose of this report is to provide instructions for recording and coding geologic log data in such a manner that it can be punched by keypunch operators.

ACKNOWLEDGMENTS

The coding system and digital computer program for this system of storage and retrieval of lithologic log data was adapted from a program developed by J.M. McNellis and C.O. Morgan (1967) for the state of Kansas as part of a cooperative program between the U.S. Geological Survey and the State Geological Survey of Kansas.

Some of the categories on the locator card are adapted from an open file report of the U.S. Geological Survey by S.M. Lang and A.R. Leonard (1967).

This adaptation of the Kansas system was developed as a cooperative project by the Minnesota Geological Survey, U.S. Geological Survey, and Division of Waters, Soils and Minerals, Minnesota Department of Conservation.

CODING LOG DATA

The log or geologic section is written and coded directly on special forms (fig. 1). Data cards are punched directly from these forms. A set of data cards for a single log consists of a header card with pertinent information about the well or geologic section and a series of cards containing the log.

The log data system consists of a series of 3-digit numbers that represent geologic unit names or descriptor words. Each formation name, descriptor word, or punctuation mark is recorded in a separate space and the number corresponding to that particular item is looked up in one of the tables and recorded in the numbered columns. Numerical, rather than alphabet codes, are used to facilitate machine processing. The system is extremely flexible because a log can be written and coded in any degree of detail provided the words used are included in the tables provided.

Locator Card

Unique Number (columns 1-7)

A unique number is assigned to each well or outcrop included in the data retrieval program. The stratigrapher at the Minnesota Geological Survey assigns blocks of numbers to agencies cooperating in this

MINNESOTA GEOLOGIC LOG, part 1

Locator Card

Unique Number 0 0 0 4 0 0 1 (1–7) County Winona (8–9)

Latitude 4 3 5 1 3 0 (10–15) Longitude 9 1 1 8 3 0 W (16–22) Accuracy 4 (23)

Township 1 0 5 (24–26) Range 4 (27–28) Section 3 3 (29–30) ¼, ¼, ¼, A (31–34)

Owner Minn Hwy Dept (35–53) Date Drilled 9 6 9 (54–57)

Address near Dresbach, Mn (Information Center, M.H.D) La Crescent Quad

Map Plotted On U.S.G.S. 15' Surface Altitude 6 6 8 (58–61) Accuracy 2 (62)

Method Drilled ? (63) Type Log Sample (64)

Other Type Logs Available Drillers (65)

Hole Depth 2 1 9 (66–69) Diameter Of Hole (70–71) Depth Cased 1 1 3 (72–74)

Finish Open hole to aquifer X (75) Purpose Withdrawal of water W (76)

Length Of Core or Number Of Samples 5 2 3 (77–80)

Log Data Cards

Pleistocene Ser 0 0 1 (8–10)	Sand 5 2 5 (11–13)	and 1 2 0 (14–16)	Grav 4 9 4 (17–19)
, 1 0 5 (20–22)	10 YR 7 4 3 (23–25)	7/4 7 8 3 (26–28)	to 2 2 0 (29–31)
N-8 7 6 2 (32–34)	, 1 0 5 (35–37)	102 feet thick 1 0 2 (38–40)	end geologic unit 9 9 8 (41–43)
Eau Claire Formation (Em) 3 4 8 (44–46)	Sdst 3 3 1 (47–49)	, 1 0 5 (50–52)	SG 7 4 8 (53–55)
8/1 7 8 5 (56–58)	, 1 0 5 (59–61)	fine 4 9 2 (62–64)	Grain 4 0 7 (65–67)
, 1 0 5 (68–70)	Glau 2 8 4 (71–73)	, 1 0 5 (74–76)	Cord Number (77–79)
60 feet thick 6 0 (8–10)	end lithologic unit 9 9 7 (11–13)	Shle 3 3 7 (14–16)	, 1 0 5 (17–19)
SG 7 4 8 (20–22)	8/1 7 8 5 (23–25)	, 1 0 5 (26–28)	Glau 2 8 4 (29–31)
30 feet thick 3 0 (32–34)	end geologic unit 9 9 8 (35–37)	Mt. Simon Formation 3 4 9 (38–40)	Sdst 3 3 1 (41–43)
, 1 0 5 (44–46)	N-7 7 6 1 (47–49)	, 1 0 5 (50–52)	Crse 4 8 3 (53–55)
27 feet thick 2 7 (56–58)	End log 9 9 9 (59–61)	Water level (62–64)	2 8 (65–67)
(68–70)	(71–73)	(74–76)	Cord Number 2 (77–79)

Figure 1a - Minnesota geologic log coding form, part 1.

MINNESOTA GEOLOGIC LOG, part 2

Log Data Cards

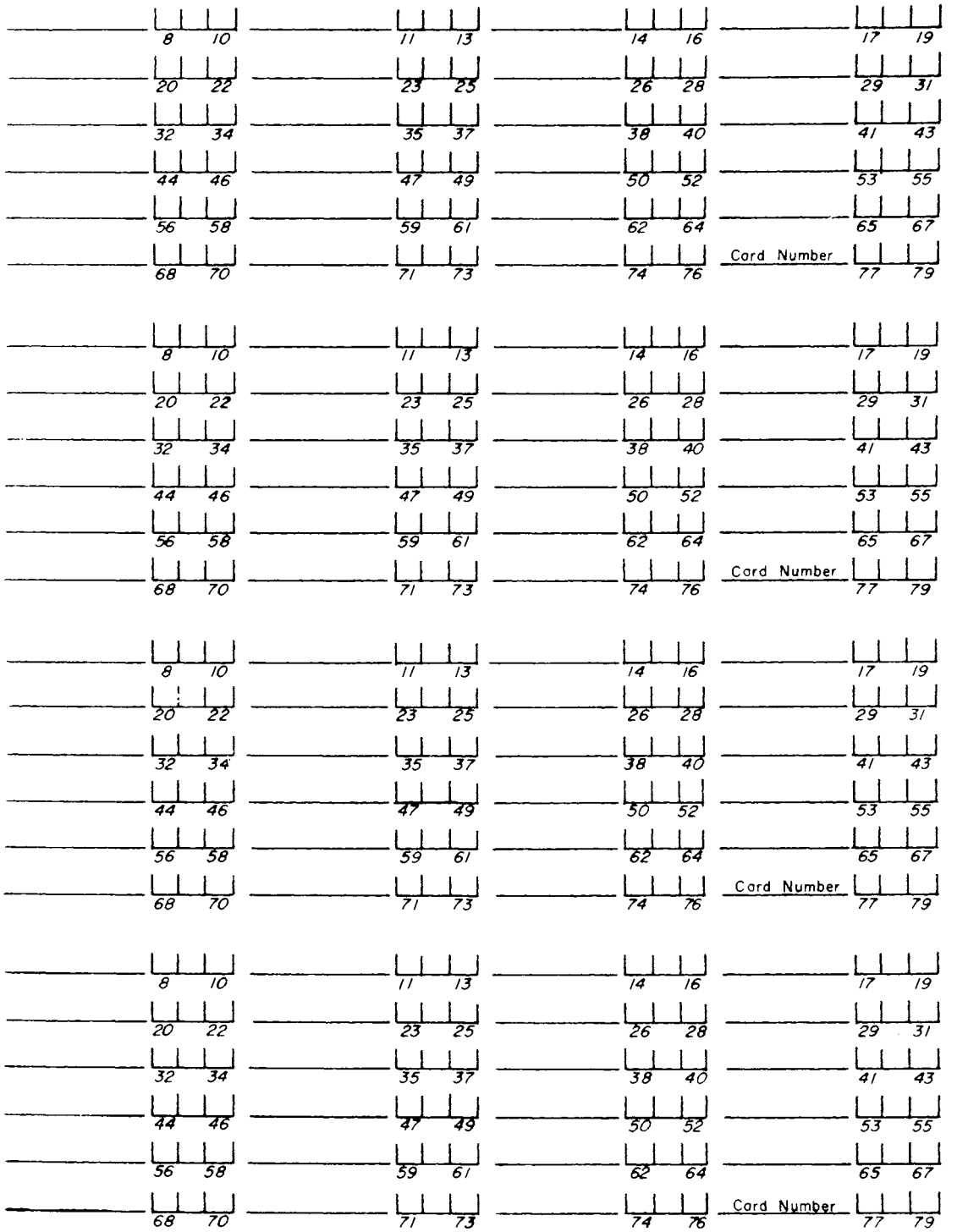


Figure 1b - Minnesota geologic log coding form, part 2.

program, so that duplication of numbers will not occur. Individuals coding digital punch cards will be assigned blocks of numbers which their supervisor has obtained from the Minnesota Geological Survey.

The number is right justified and leading zeros must be used if the number is smaller than seven digits :

0	0	0	4	0	0	1
1	2	3	4	5	6	7

County (columns 8 and 9)

Insert the appropriate number, right justify. If the well is in a neighboring state (or Canada) assign the appropriate number.

01. Aitkin
02. Anoka
03. Becker
04. Beltrami
05. Benton
06. Big Stone
07. Blue Earth
08. Brown
09. Carlton
10. Carver
11. Cass
12. Chippewa
13. Chisago
14. Clay
15. Clearwater
16. Cook
17. Cottonwood
18. Crow Wing
19. Dakota
20. Dodge
21. Douglas
22. Faribault
23. Fillmore
24. Freeborn
25. Goodhue
26. Grant
27. Hennepin
28. Houston
29. Hubbard
30. Isanti
31. Itasca
32. Jackson
33. Kanabec
34. Kandiyohi
35. Kittson
36. Kchiching
37. L qui Parl
38. Lake
39. L of Woods
40. Le Sueur
41. Lincoln
42. Lyon
43. McLeod
44. Mahnomen
45. Marshall
46. Martin
47. Meeker
48. Mille Lacs
49. Morrison
50. Mower
51. Murray
52. Nicollet
53. Nobles
54. Norman
55. Olmsted
56. Otter Tail
57. Pennington
58. Pine
59. Pipestone
60. Polk
61. Pope
62. Ramsey
63. Red Lake
64. Redwood
65. Renville
66. Rice
67. Rock
68. Roseau
69. St. Louis
70. Scott
71. Sherburne
72. Sibley
73. Stearns
74. Steele
75. Stevens
76. Swift
77. Todd
78. Traverse
79. Wabasha
80. Wadena
81. Waseca
82. Washington
83. Watonwan
84. Wilkin
85. Winona
86. Wright
87. Y Medicine
88. Iowa
89. Wisconsin
90. N Dakota
91. S Dakota
92. Canada

Latitude (columns 10-15)

Degrees are entered in columns 10 and 11, minutes in columns 12 and 13 and seconds in columns 14 and 15. If the location is not known to the second, the location may have to be rounded off to 10 seconds

or to the nearest minute. Accuracy is indicated by underscoring the last accurate digit. For example, if the location is known to ten seconds accuracy:

9	3	2	2	3	0
10				–	15

Longitude (columns 16-22)

Longitude is treated the same way as latitude except W is inserted for West in column 22. A sequential number (optional; needed for use by U.S.G.S.) may be substituted for W in column 22 if more than one well is known to have the same latitude and longitude.

7	5	4	7	4	0	2
16				–		22

75^{o} 47' 40" W., Well No. 2

Latitude and Longitude Accuracy (column 23)

Insert appropriate number.

1 = Field and map location are both accurate to within a second. (100 feet is approximately one second of latitude.) Well was field checked and its exact position was plotted on a 7½′ quadrangle.

2 = Location not accurate to within a second, but accurate to better than 10 seconds of latitude and longitude. (Map suitable, inaccuracy due to inadequate field data.) Well is plotted on a 7½′ quadrangle to ¼, ¼, ¼ of a section.

3 = Location accurate to within 10 seconds of latitude and longitude. (Maps inadequate.) Well is accurately plotted on a 15′ quadrangle to ¼, ¼, ¼ of a section.

4 = Location accurate to within a minute. (Maps adequate, but well location imprecise.) Well is plotted to nearest section on 7½′ or 15′quadrangles.

5 = Field location is accurate only to within a minute and map scale is suitable only for determining minutes. (Maps are smaller scale than 15′ quadrangles [1:62,500].) Applies to wells plotted on 1:250,000 topographic maps and most county road maps.

Township (columns 24-26)

All townships are north in Minnesota. Therefore only the township number is needed, right justify.

	2	8
24		26

= T 28 N

1	1	6
24		26

= T 116 N

Range (columns 27-28)

Range is assumed to be West unless otherwise indicated, right justify.

	1
27	28

= R 1 W

1	E
27	28

= R 1 E

2	5
27	28

= R 25 W

Section (columns 29 and 30)

Right justify.

Location within a Section (columns 31-34)

Well-numbering system. The system of numbering wells and measured sections is based on the U.S. Bureau of Land Management's system of subdivision of the public lands. The well number, in addition to designating the well, locates its position in the land network. The first segment of a well number indicates the township north of the base line; the second, the range west of the principal meridian; and the third, the section in which the well is located. The lower case letters a, b, c, and d, following the section number, locate the well within the section. The first letter denotes the 160-acre tract, the second denotes the 40-acre tract, and the third the 10-acre tract. The letters are assigned in a counter-clockwise direction beginning in the northeast quarter. Consecutive numbers beginning with one are added as suffixes to designate wells within one 10-acre tract. Thus, the number 136.39.19abd1 identifies the first well or test hole located in the SE1/4NW1/4NE1/4, sec. 19, T. 136 N., R. 39 W.

Use the alphabetic well location. If the location is to the nearest ¼, ¼, ¼ the alphabetic well location will fill columns 31, 32, and 33 (34 is reserved for a well number if there is more than one well at that location). If the location is to the nearest ¼, ¼ use columns 31 and 32 for the alphabetic well location. A location to the nearest ¼ would have the alphabetic well location in column 31. Column 34 is used for the additional ¼ section location when the well is located to the nearest ¼, ¼, ¼, ¼.

Code		Conventional
A	=	NE
B	=	NW
C	=	SW
D	=	SE
ABC	=	SW NW NE
ABD1	=	SE NW NE Well 1

Owner (columns 35-53)

Write the owner's name in these spaces, left justify. If the owner is a private individual write his last name first, followed by his first name and middle initial. Use appropriate punctuation marks. If there is insufficient space for an individual's full name use the appropriate initial instead of his first name and, if necessary, omit the last portion of his last name.

Companies and governmental agencies are designated by their names or, if the name is too long, by an appropriate and generally accepted abbreviation. For example, the United States Geological Survey is commonly designated as the U.S.G.S.

Date Drilled

Month (column 54). The month is represented by an alphabetic code. Leave blank if month is not known.

Code	Month
A	January
B	February
C	March
D	April
E	May
F	June
G	July
H	August
I	September
J	October
K	November
L	December

Year (columns 55-57). The year is represented by its last three digits.

950 is 1950
863 is 1863

Address

Write in address of owner. This is not coded.

Map Plotted On

Write in name of quadrangle or county map and state the scale of map (1:62,000, etc.) and agency that prepared map, (i.e., U.S.G.S., Army Map Service, State of Minnesota). This is not coded.

Surface Altitude (columns 58-61)

Write in land surface altitude at well site, right justify.

Altitude Accuracy (column 62)

This designates to what degree of accuracy altitude above mean sea level has been determined.

1 = Instrument level to the closest 0.1 foot.
2 = Instrument level to the closest 1.0 foot.
3 = Topographic map 1:24,000 scale to closest 5 feet.
4 = Topographic map 1:62,500 scale to closest 10 feet.
5 = Topographic map greater than 1:62,500 scale to closest 50 feet.
6 = Altimeter to closest 5 feet. Same as for 1:24,000 scale topographic map.

Method Drilled (column 63).

Code		Method drilled	Code		Method drilled
A	=	Air	H	=	Hydraulic rotary
B	=	Bored (or augered)	J	=	Jetted
C	=	Cable-tool	R	=	Reverse rotary
D	=	Dug	S	=	Spring
V	=	Driven	T	=	Trenching
E	=	Dug, drilled	G	=	Bored, drilled
F	=	Dug, driven			

Type Log (column 64).

Code		Data available
A	=	Driller's log
B	=	Electrical log (SP and resist)
C	=	Gamma Ray log
D	=	Neutron
E	=	Microlog
F	=	Later log
G	=	Sonic log
H	=	Caliper log
I	=	Temperature log
J	=	Current meter
K	=	Neutron moisture probe log
L	=	Sample log
M	=	Dr. and E. log
N	=	Dr., E. log, G. ray
O	=	Dr., E. log, G. ray, Sample (code ∅ on log form)
P	=	Dr., G. ray, Sample
Q	=	Dr., Sample log
R	=	Driller's, G. ray
S	=	E. log, Sample log
T	=	G. ray, E. log
U	=	G. ray, Sample
V	=	Other
W	=	Core
X	=	Measured section to closest 1 foot
Y	=	Measured section to closest 0.1 foot

Other Type Logs Available (column 65)

Same as for preceding *(Type Log)* excluding X and Y.

Hole Depth (columns 66-69)

Self explanatory. Code to nearest foot, right justify.

Diameter of Hole (columns 70 and 71)

Self explanatory. Code to nearest inch, right justify.

Depth Cased (columns 72-74)

Self explanatory. Code to nearest foot, right justify.

Finish (column 75)

"Finish" refers to the character and position of the openings that permit water to enter the well. Enter the code letter for the appropriate finish in the box for column 75. If the finish is unknown, leave the box for column 75 blank.

C	Porous concrete
F	Gravel wall, perforated or slotted casing
G	Gravel wall, commercial screen
H	Horizontal gallery or collector
Ø	Open end
P	Perforated or slotted casing
S	Screen
T	Sand point
W	Walled or shored
X	Open hole in aquifer (generally cased to aquifer)
Z	Other

Porous concrete is concrete casing that is not impervious but allows ground water to seep into the well.

A *gravel-wall* well is a drilled or dug well that has a gravel envelope opposite the part through which water enters. Commonly, these wells will be finished either with commercial screen or with torch-slotted or machine-slotted casing. Separate classes are used to distinguish between the two types of openings.

A *horizontal gallery or collector* essentially is a horizontal-type well in which the screen, slotted pipe, or gravel-filled trench is horizontal. Ranney collectors and infiltration galleries are of this type, but all horizontal wells should be in this class.

An *open-end* well is one that is cased to the bottom of the hole so that water can enter the well only through the bottom of the hole.

Perforated or slotted casing is well pipe that has had holes punched or slots cut in it to admit water. Perforations may be cut, drilled, or punched in the casing in the shop or during manufacture. Pipe may be perforated in a well, using commercial "gun perforating" services. Slots may be cut by torch, machine cut in the shop, or even cut in the well. Light-weight galvanized well casing with pressed louver-type openings is perforated casing, not screen.

Screen refers to commercial well screen manufactured for the purpose of admitting water to a well. Common types of screen are wire mesh, wrapped trapezoidal wire, and shutter screen.

A *sand point* is the screened part of a drive point and usually is part of a driven well or may be used to deepen a drilled or dug well.

A *walled or shored* well is usually a dug well in which the walls have been shored up with open-jointed fieldstone, brick, tile, concrete blocks, wooden cribbing, or other material. A few wells of this type may have gravel walls; however, they should be placed in this category instead of F or G. A dug well that is mostly open hole but has only a few feet of cribbing, corrugated pipe, or other shoring to prevent caving should be in this category.

An *open* hole is cased below the depth of possible surface contamination, slumpage, or into solid rock and finished open hole in the aquifer. A well belongs in this class even if the casing does not actually extend to the geologic unit or zone from which the water is obtained.

Purpose of Well or Test Hole (column 76)

If the use of the well is unknown, column 76 should be left blank. If the well has not been put into use when inventoried, show the *intended* use, such as *waste disposal,* or *withdrawal of water* rather than *unused.* Codes are:

A	Anode	R	Recharge
D	Drainage	S	Gas storage
G	Seismic hole	T	Test hole
H	Heat reservoir	U	Unused
Ø	Observation	W	Withdrawal of water
P	Oil or Gas	X	Waste disposal
		Z	Destroyed

Anode is a hole used as an electrical anode. Include in this category wells used solely to ground pipelines or electronic relays and other installations.

Drainage means the drainage of surface water underground.

Seismic hole is one drilled for seismic exploration. If it has been converted to water supply, it is used to withdraw water. A seismic hole used as an observation well should be in the observation-well category (Ø).

Heat reservoir refers to a well in which a fluid is circulated in a closed system. Water is neither added to nor removed from the aquifer.

Observation well is a cased test hole or well drilled for observations, either water-level or quality of water. Do not use this category for an oil-test hole, or water-supply well used only incidentally as an observation well.

Oil or gas well is any well or hole drilled in search of or for production of petroleum or gas and includes any oil or gas production well, dry hole, core hole, injection well drilled for secondary recovery of oil, etc. An oil-test hole converted to a water-supply well should be designated as used to withdraw water (W). Holes drilled for seismograph testing should be classified as seismic (G).

Recharge well is one constructed for or converted for use in replenishing the aquifer. An irrigation well used to return water to the aquifer during nonpumping periods is a well for withdrawing water, not a drainage or recharge well. Use this category for wells that are used to return water to the aquifer after use, such as those for returning air-conditioning water.

Gas storage is a well constructed specifically for injection or withdrawal of gas from a gas storage unit. Wells drilled to evaluate gas storage sites are not included in this category. They are classified as test holes.

Test hole is an uncased hole (or one cased only temporarily) that was drilled for water, or for geologic or hydrogeologic testing. It may be equipped temporarily with a pump in order to make a pumping test, but if the well is destroyed after testing is completed, it is still a test hole. A core hole drilled as a part of mining or quarrying exploration work, which is geologic, should be in this class.

An *unused* well is an abandoned water-supply well or one for which no use is contemplated. At an abandoned farmstead, a well originally used for domestic purposes may be classed as unused even though it is equipped with a pump. Similarly a stock well, with a pump, may become unused when a pasture or corral is put into cultivation. An irrigation well that is not equipped with a pump or that is not used because the yield is too low or the water too mineralized belongs in this class.

Withdrawal of water refers to a well that supplies water. It includes a dewatering well, if the dewatering is accomplished by pumping ground water.

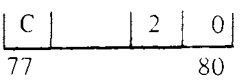
A *waste-disposal* well is one used to convey industrial waste, domestic sewage, oil-field brine, mine drainage, radioactive waste, or other waste fluid into an underground zone. An oil test or deep-water well converted to waste disposal should be in this category.

A *destroyed* well is one that is no longer in existence. The casing of most destroyed wells will be pulled, but some may be plugged or filled. Do not use this category for an abandoned well that merely is not in use.

Length of Core or Number of Samples (columns 77-80)

Refers to length of core or number of samples available (generally stored at Minnesota Geological Survey or at U.S. Bureau of Mines). Enter C for core or S for samples in column 77. Enter total core length to nearest foot or number of samples in columns 78-80, right justify:

Number is total length of all core segments or total number of samples even if separated by unsampled intervals.



If both samples and core are available from the same well, indicate the length of core.

Log Data Cards

Unique Number (columns 1-7)

The unique number is repeated by the keypunch operator on each log data card and is checked within the program against the number on the header card. If the numbers do not agree, the log will be bypassed and the program will go to the next log.

Log Data (columns 8-76)

Twenty-three fields of three columns for log data are allowed on each data card.

The following codes are used to indicate the end of a *lithologic unit*, the end of a *geologic unit*, the end of a *geologic unit with water level*, and the *end of the log*.

End of a lithologic unit
997–follows a list of descriptors and a thickness; indicates that a lithologic unit ends.

End of geologic unit
998–follows a list of descriptors and a thickness; indicates that a geologic unit ends.

End of geologic unit with water level

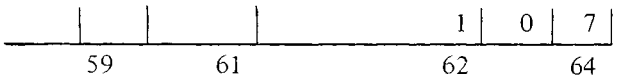
996—follows a list of descriptors, a thickness and a water level; indicates that a geologic unit with water level* ends.

End of log

999—follows a list of descriptors and a thickness; indicates that this is the end of the log. A water level can follow the 999.

*Water level – The water level requires 6 columns or 2 descriptor positions.

Right justify the water level in these 6 columns (example 1).



Example 1

If the water level is measured to the nearest 0.1, put a "1" in column 1 (example 2, water level is 107.6).

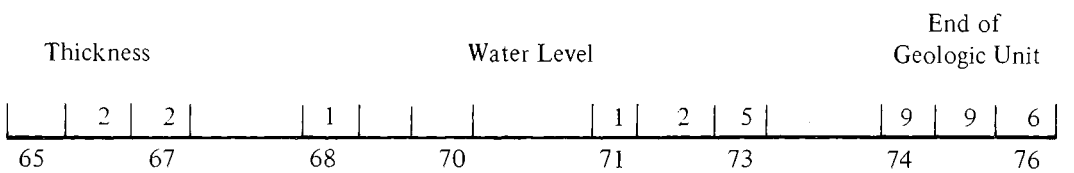
Example 2

If the water level is determined to the nearest foot, leave column 1 blank (example 1, water level is 107).

The water level can be given for each geologic unit and/or for the well.

For Geologic Unit.

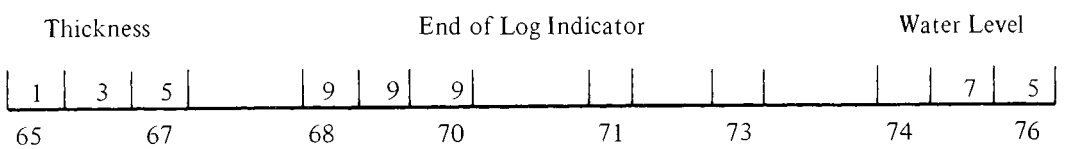
The water level follows the thickness position and precedes 996, the indicator for the end of a geologic unit with water level. (example 3, thickness is 22 feet, water level is 12.5 feet).



Example 3

For Well or Last Geologic Unit.

If a water level is included with the log or with the last geologic unit, it must be placed in the 6 columns (2 descriptor positions) following the end of log indicator 999. (example 4, thickness is 135 feet, water level is 75 feet).



Example 4

Comment Cards

Additional information of any kind may be included on comment cards. A comment card has an asterisk (*) in the first column: any sort of information in any format may be punched in the remaining columns. Any number of comment cards may follow the log data cards. Typical examples might be:

***SAMPLE STUDY IN MAJEWSKE'S THESIS, U OF M, 1953.**

***LOG IS CONFIDENTIAL – NOT FOR PUBLICATION.**

The string of characters (except for the asterisk) will be printed after the header-card information and before the log itself.

GEOLOGIC UNITS AND DESCRIPTORS

The numeric codes for more than 70 named and unnamed Minnesota geologic units are listed in Table 1. Abbreviations used in this table are listed in Table 2.

The descriptors available for use number over 800, are coded with sequential numbers, and are contained in 12 categories:

Category	Code Numbers	Table
Numerals	1-100	Not included in table
Punctuation characters	101-111	3A
Miscellaneous words	112-229	3B-1
Minerals and rocks	230-369	3B-2
Structures and textures	370-474	3B-3
Sizes and quantities	475-539	3B-4
Shapes and indurations	540-599	3B-5
Fossils	600-669	3B-6
Compositions	670-709	3B-7
Lusters	710-739	3B-8
Colors	795-832	3B-9
Rock color chart	740-794	3C

The words listed are followed by their computer print-out abbreviation and the numeric input code. Various forms of some of the words are also listed, others may be assumed. Suffixes and prefixes are included so that various word combinations may be made by using two code numbers.

For the purpose of consistency, descriptors should follow the name of the unit in the following order: 1) Primary lithology; 2) Color; 3) Secondary lithology or composition; 4) Grain size, sorting, and structure (bedding, banding, jointing, brecciation, foliation, etc.) or texture (grain or crystal size and shapes).

Various miscellaneous features of the unit may follow the above descriptors. These include types of fossils present, induration, presence of minor amounts of minerals that may be of unusual interest, or presence of unusual sedimentary structures such as geodes or septarian nodules. Total thickness of the unit comes last and always directly precedes an end of geologic unit, end of lithologic unit or end of log indicator, except when there is a water level for the unit.

Table 1 – Stratigraphic list of geologic units used in Minnesota

PLEISTOCENE SER	001
CRETACEOUS SYS	100
COLERAINE FM	101
WINDROW FM	102
OSTRANDER MBR	103
IRON HILL MBR	104
PIERRE FM	106
NIOBRARA FM	107
CARLILE FM	108
GREENHORN FM	109
BELLE FOURCHE FM	110
CRETACEOUS UNDIFF	111
Pre-Cretaceous of northwestern Minnesota:	
JURASSIC SYS	200
AMARANTH FM	201
ORDOVICIAN SYS	202
STONEWALL FM	203
STONY MOUNTAIN FM	204
RED RIVER FM	205
WINNIPEG FM	206
Pre-Cretaceous of southeastern Minnesota:	
DEVONIAN SYS	301
SHELL ROCK FM	302
CEDAR VALLEY FM	303
CORALVILLE MBR	304
RAPID MBR	305
SOLON MBR	306
ORDOVICIAN SYS	202
MAQUOK-GALENA FMS	308
MAQUOKETA FM	309
CLERMONT MBR	310
ELGIN MBR	311
DUBUQUE-GALENA FMS	312
DUBUQUE FM	313
GALENA FM	314
STEWARTVILLE MBR	315
PROSSER MBR	316
CUMMINGSVILLE MBR	317
DECORAH FM	318

Table 1 (cont.)

PLATTEVILLE FM	319
CARIMONA MBR	320
MCGREGOR MBR	321
PECATONICA MBR	322
GLENWOOD FM	323
ST. PETER FM	324
PRAIRIE DU CHIEN GP	325
SHAKOPEE FM	326
WILLOW RIVER MBR	327
NEW RICHMOND MBR	328
ONEOTA FM	329
ORD UNDIFF	357
CAMBRIAN SYS	330
JORDAN FM	331
SUNSET POINT MBR	332
VAN OSER MBR	333
NORWALK MBR	334
JORDAN-ST. LAW FMS	355
ST. LAW-FRAN FMS	335
ST. LAWRENCE FM	336
LODI MBR	337
BLACK EARTH MBR	338
FRANCONIA FM	339
MAZO-RENO MBRS	356
MAZOMANIE MBR	340
RENO MBR	341
TOMAH MBR	342
BIRKMOSE MBR	343
IRONTON-GALES FMS	344
IRONTON FM	345
GALESVILLE FM	346
'DRESBACH'	347
EAU CLAIRE FM	348
MT. SIMON FM	349
CAMB UNDIFF	350
PRECAMBRIAN SYS	351
BELLE PLAINE FM	352
HINCKLEY FM	353
FOND DU LAC FM	354

Table 2 - Abbreviations used in geologic unit names

Name	Abbrev.
CAMBRIAN	CAMB
FORMATION	FM
FORMATIONS	FMS
FRANCONIA	FRAN
GALESVILLE	GALES
GROUP	GP
MAQUOKETA	MAQUOK
MAZOMANIE	MAZO
MEMBER	MBR
MEMBERS	MBRS
SERIES	SER
ST. LAWRENCE	ST. LAW
SYSTEM	SYS
UNDIFFERENTIATED	UNDIFF

Table 3 - Descriptors for use on the Minnesota log form.

A. Punctuation characters.

Print Out	Numeric Code
. - Period	107
, - Comma	105
(- Left paren.	109
) - Right paren.	111
* - Asterisk (no special use)	110
$ - Dollar sign (used as query, replaces a ?)	106
/ - Slash (used as semicolon and in color chart)	102
= - Equal	104
- - Minus	108
+ - Plus	103
- - Dash	101

Table 3 B. Alphabetic list of descriptors

1. Miscellaneous Words

Descriptor (Word or Words)	Print Out of Abbreviation	Numeric Code
A	A	113
ABOVE	ABOV	114
AERIAL	AERL	115
AGGREGATE	AGGT	116
ALLUVIAL	ALVL	117
ALTER, ALTERED, ALTERING	ALTR	118
AN	AN	119
AND	AND	120
APPARENT, APPARENTLY	APAR	121
APPEAR, APPEARS, APPEARED	APER	122
AS	AS	123
AT	AT	124
BAILED	BAIL	125
BASAL	BASL	126
BEARING, BEAR	BEAR	127
BOTTOM	BOTM	128
BRACKISH	BRCK	129
BUT	BUT	120
CASED, CASE	CASD	131
CAST, CASTIC	CAST	132
CAVE, CAVING	CAVE	133
CENTER, CENTERED	CNTR	134
CHANGE, CHANGED	CHNG	135
CLEAN	CLEN	136
COMPOSE, COMPOSED	COMP	137
CONSIST	CNST	138
CONTACT	CNTC	139
CONTAIN, CONTAINED	CTN	140
CONTINENTAL	CNTL	141
CONTINUE, CONTINUED	CNTU	142
CORNER	CRNR	143
COVERED, COVER	CVRD	144
CROSS	CRSS	145
CUTTINGS	CTNG	146
DEAD	DEAD	147

Table 3 B 1. (cont.)

DEBRIS	DBRS	148
DETERMINE, DETERMINED	DTRM	149
DISSEMINATE, DISSEMINATED	DSMT	150
DISTINCT, DISTINCTLY	DSTC	151
DRY	DRY	152
DUNE	DUNE	153
EMBEDDED, EMBED	EMBD	154
ENLARGED, ENLARGE	ENLD	155
ETC	ETC	156
EXPOSE, EXPOSED, EXPOSURE	XPOS	157
FACIES	FCES	158
FAINT	FANT	159
FAIR	FAIR	160
FILL	FILL	229
FLOATING, FLOAT	FLTG	161
FLUVIAL	FLUV	162
FRESH	FRSH	163
GOOD	GOOD	164
HEAVY	HEVY	165
HYPER	HYPR	166
IMBEDDED	IMBD	167
IMPERVIOUS	IMPR	168
IMPRESSION	IMPS	169
IN	IN	170
INCLUDE, INCLUDED	INCL	171
INDISTINCT	NDST	172
LEACHED, LEACH	LCHD	173
LITHOLOGY	LITH	174
LOCALLY, LOCAL	LOCL	175
MAGNETIC	MAGN	176
MARGIN	MRGN	177
MARINE	MRNE	178
MATERIAL, MATTER	MTRL	179
MATRIX	MTRX	180
MEMBER	MEMB	181
MISCELLANEOUS	MISC	182
NO	NO	183
NON	NON	184
NORMAL	NORM	185
NOT	NOT	186
OBJECT	OBJC	187

Table 3 B 1. (cont.)

ODOR	ODOR	188
OF	OF	189
OFTEN	OFTN	190
OR	OR	191
OUT	OUT	192
PER	PER	193
CENT	CENT	194
PERMEABILITY, PERMEABLE	PERM	195
POOR, POORLY	POOR	196
POROSITY, POROUS	PORS	197
POSSIBLE, POSSIBILITY	PSBL	198
PREDOMINATE, PREDOMINANTLY	PRDT	199
PRESERVE, PRESERVED, PRESERVATION	PRSR	200
PROBABLE, PROBABLY	PROB	201
PROMINENT, PROMINENTLY	PROM	202
PSEUDO	PSDO	203
PYRO	PYRO	204
RADIATE, RADIATING	RADT	205
RANGE, RANGING	RNGE	206
REPLACE, REPLACED, REPLACING, REPLACEMENT	REPL	207
REPORT, REPORTED	REPT	208
ROAD	ROAD	209
SALINE	SALN	210
SATURATED, SATURATION	SATR	211
SCATTERED	SCAT	212
SOLUTION	SLTN	213
SORT, SORTED, SORTING	SORT	214
SUB	SUB	215
SUPER	SUPR	216
TERRESTRIAL	TERR	217
THE	THE	218
THROUGH	THRU	219
TO	TO	220
TOP	TOP	221
TRACE	TRAC	222
UNDIFFERENTIATED	UNDF	228
UPPER	UPPR	223
USUALLY	USUL	224
VERY	VERY	225
WELL	WELL	226
WITH	WITH	227

Table 3 B 2. Minerals and Rocks

Descriptor (Word or Words)	Print Out of Abbreviation	Numeric Code
ACTINOLITE	ACTN	230
AGGLOMERATE	AGLM	231
ALLUVIUM	ALVM	232
ANATASE	ANAT	233
ANDALUSITE	ANDL	234
ANHYDRITE, ANHYDRITIC	ANHY	235
APATITE	APAT	236
ARAGONITE	ARAG	237
ARKOSE, ARKOSIC	ARKS	238
ASH	ASH	239
ASPHALT, ASPHALTIC	ASPH	240
AUGITE	AUGT	241
BARITE, BARITIC	BART	242
BASALT	BSLT	243
BENTONITE, BENTONITIC	BENT	244
BIOTITE	BIOT	245
BITUMEN, BITUMINOUS	BTMN	246
BRECCIA, BRECCIATED, BRECCIATION	BREC	247
BROOKITE	BRKT	248
CALCITE	CLCT	249
CALCIUM	CLCM	250
CALICHE	CLCH	251
CARBONATE	CARB	252
CASSITERITE	CASS	253
CEMENT, CEMENTED	CMNT	254
CHALCEDONY	CHAL	255
CHALK, CHALKY	CHLK	256
CHERT	CHRT	257
CHITIN, CHITINOUS	CHIT	258
CHLORITE	CLRT	259
CHLORITOID	CLRD	260
CLASTIC	CLAS	261
CLAYSTONE	CLST	262
CLINOZOISITE	CLNZ	263
COAL	COAL	264
COLLOPHANE	CLPN	265
CONGLOMERATE	CONG	266
COQUINA	COQN	267

Table 3 B 2. (cont.)

CORDIERITE	CORD	268
CORUNDUM	CRND	269
DEPOSIT, DEPOSITED	DPST	270
DIOPSIDE	DIOP	271
DIORITE	DIOR	272
DOLOMITE, DOLOMITIC	DLMT	273
DRIFT	DRFT	274
DUMORTIERITE	DUMR	275
ENSTATITE	ENST	276
EPIDOTE	EPID	277
FELDSPAR, FELDSPATHIC	FELD	278
FLINT	FLNT	279
FLUORITE	FLOR	280
GABBRO	GBRO	281
GALENA	GLNA	282
GARNET	GARN	283
GLAUCONITE, GLAUCONITIC	GLAU	284
GNEISS	GNIS	285
GRANITE	GRNT	286
GRAYWACKE	GWKE	287
GYPSUM, GYPSIFEROUS	GYPS	288
HEMATITE, HEMATITIC	HEMA	289
HORNBLENDE	HRNB	290
HYDROCARBON	HYDO	291
HYPERSTHENE	HYPS	292
IGNEOUS	IGNS	293
ILMENITE	ILMN	294
IRON	IRON	295
IRONSTONE	INST	296
JASPER, JASPEROID	JASP	297
KAOLIN	KAOL	298
LEUCOXENE	LEUC	299
LIGNITE, LIGNITIC	LIGN	300
LIMESTONE	LMST	301
LIMONITE	LIMN	302
LOESS	LOES	303
MAGNESITE	MGNS	304
MAGNETITE	MGNT	305
MARL	MARL	306
MARLSTONE	MRST	307
METAMORPHIC	META	308

Table 3 B 2. (cont.)

MICA	MICA	309
MINERAL, MINERALIZED	MNRL	310
MONZONITE	MONZ	311
MUD	MUD	312
MUDSTONE	MDST	313
MUSCOVITE	MUSC	314
OIL	OIL	315
OLIVINE	OLVN	316
OPAL, OPALIZED	OPAL	317
ORTHOCLASE	ORTH	318
OXIDE	OXID	319
PEARL, PEARLY	PERL	320
PETROLEUM, PETROLIFEROUS	PETR	321
PHOSPHATE, PHOSPHATIC	PHOS	322
PISOLITE, PISOLITIC	PISO	323
PLAGIOCLASE	PLAG	324
PYRITE, PYRITIZED	PYRT	325
QUARTZ	QRTZ	326
QUARTZITE	QTZT	327
ROCK	ROCK	328
RUTILE	RUTL	329
SALT, SALTY	SALT	330
SANDSTONE	SDST	331
SCHIST	SHST	332
SEDIMENT	SDMT	333
SEDIMENTARY	SDMY	334
SELENITE	SELN	335
SERPENTINE	SERP	336
SHALE	SHLE	337
SIDERITE, SIDERITIC	SIDR	338
SILICA	SILC	339
SILLIMANITE	SILM	340
SILTSTONE	STST	341
SLATE	SLTE	342
SOIL	SOIL	343
SPHALERITE	SPHL	344
SPHENE	SPHN	345
SPINEL	SPNL	346
STAUROLITE	STAU	347
STONE	STON	348
SUBSOIL	SBSL	349
SULPHATE	SLPT	350
SULPHER	SLPR	351
SYENITE	SYEN	352
TILL, TILLITE	TILL	353
TOPAZ	TOPZ	354
TOURMALINE	TOUR	355

Table 3 B 2. (cont.)

TRAVERTINE	TRAV	356
TREMOLITE	TREM	357
TRIPOLI, TRIPOLITIC	TRIP	358
VOLCANIC, VOLCANICS	VOLC	359
WATER	WATR	360
XENOTIME	XENO	361
ZEOLITE	ZEOL	362
ZIRCON	ZIRC	363
ZOISITE	ZOIS	364

Table 3 B 3. Structures and textures

Descriptor (Word or Words)	Print Out of Abbreviation	Numeric Code
ACCESSORY	ACCS	370
BALL	BALL	371
BAND, BANDED	BAND	372
BED, BEDDED, BEDDING	BED	373
CALATE	CLTE	374
CLUSTER, CLUSTERED	CLST	375
CONCRETION, CONCRETIONARY	CONC	376
CONE	CONE	377
CONTORT, CONTORTED	CNTT	378
CRACK, CRACKED	CRAC	379
CRENULATE, CRENULATED	CREN	380
CREVICE, CREVICES	CREV	381
CRINKLE, CRINKLED	CRNK	382
CRYPTO	CRPT	383
CRYSTAL, CRYSTALLINE	CRYS	384
CURRENT	CRNT	385
CUT-OUT	CTOT	386
DENDRITE, DENDRITIC	DEND	387
DIKE	DIKE	388
DISRUPT, DISRUPTED	DSRP	389
DOLO	DOLO	390
DRUSE, DRUSY	DRSE	391
EXTRUDE, EXTRUDED	EXTD	392
EXTRUSION, EXTRUSIVE	EXTS	393
FAULT,FAULTED	FALT	394
FIGURE, FIGURED	FIGR	395
FINGER	FING	396
FISSILE	FISL	397

Table 3 B 3. (cont.)

FLAG, FLAGGY	FLAG	398
FLAKE, FLAKY	FLKE	399
FOLD, FOLDED	FOLD	400
FOLIATE, FOLIATED	FLTE	401
FORMATION	FORM	402
FRACTURE, FRACTURED	FRAC	403
GALL	GALL	404
GEODE	GEOD	405
GRADE, GRADES, GRADED, GRADING	GRAD	406
GRAIN, GRAINED	GRAN	407
GRANULAR	GRNR	408
GRIT, GRITTY	GRIT	409
GROWN, GROWTH	GRWN	410
HACKLY	HCKL	411
INCLUSION	INCS	412
INTER	INTR	413
INTERVAL	INTV	414
INTRA	NTRA	415
INTRUDE, INTRUDED	INTD	416
INTRUSION, INTRUSIVE	INTS	417
JOINT, JOINTS, JOINTED	JONT	418
LAMINATION, LAMINATED	LMNT	419
LAYER	LAYR	420
LENTIL, LENTICULAR	LENT	421
LIKE	LIKE	422
LINEATION	LNAT	423
LUMP, LUMPY	LUMP	424
MAT	MAT	425
NODULE	NODL	426
OOLI	OOLI	427
OOLITE, OOLITIC	OOLT	428
PART, PARTLY, PARTING	PART	429
PIN	PIN	430
PIT, PITTED	PIT	431
PLASTIC	PLAS	432
PLATE, PLATY	PLTE	433
POINT, POINTED	PONT	434
RHYTHM, RHYTHMATIC	RHYM	435
RIPPLE	RIPL	436
ROSETTE, ROSE	RSET	437
ROUGH	RUGH	438
RUBBLE, RUBBLY	RUBL	439
SCOOP	SCOP	440
SEPTARIA	SEPT	441
SILL	SILL	442
SLAB, SLABBY	SLAB	443
SLICKENSIDES	SLSD	444

Table 3 B 3. (cont.)

SMOOTH	SMTH	445
SPASTOLITH	SPTL	446
SPATULATE	SPAT	447
SPHERULE, SPHERULES	SPHR	448
SPLINTER, SPLINTERY	SPLN	449
STITIAL	STIT	450
STRATA, STRATIFIED, STRATIFICATION	STRT	451
STRATIFY	STRY	452
STRIATE, STRIATED, STRIATIONS	STRI	453
STRINGER	STRG	454
STRUCTURE	STRC	455
STYLOLITE	STYL	456
SUCROSE	SUCR	457
SURFACE	SURF	458
TEXTURE	TEXT	459
TUBE, TUBULAR	TUBE	460
UNCONFORMITY	UNCN	461
VARVE, VARVED	VRVE	462
VEIN, VEINLETS	VEIN	463
VESICLE, VESICULAR	VSCL	464
VUG, VUGGY, VUGULAR	VUG	465
WAVE, WAVY	WAVE	466
ZONE, ZONES	ZONE	467

Table 3 B 4. Sizes and quantities

Descriptor (Word or Words)	Print Out of Abbreviation	Numeric Code
ABOUT	ABUT	475
ABUNDANT, ABUNDANTLY	ABNT	476
AMOUNT	AMNT	477
APPROXIMATE, APPROXIMATELY	APRX	478
AVERAGE	AVRG	479
BOULDER	BLDR	480
BRIEF	BREF	481
CLAY, CLAYEY	CLAY	482
COARSE, COARSELY, COARSER	CRSE	483
COBBLE	CBLE	484
COMMON	COMM	485
DECREASE, DECREASING	DECR	486
DIAMETER	DIAM	487
DIFFERENCE	DIFF	488
EQUAL	EQAL	489
EQUIVALENT	EQIV	490

Table 3 B 4. (cont.)

FEET	FEET	491
FINE, FINELY	FINE	492
GRANULE, GRANULES	GRNL	493
GRAVEL, GRAVELLY	GRAV	494
HIGH	HIGH	495
HORIZONTAL	HZTL	496
INCHES, INCH	INCH	497
INCREASE, INCREASING	INCR	498
LARGE, LARGER	LRGE	499
LITTLE	LTLE	500
LONG	LONG	501
LOW, LOWER	LOW	502
MACRO	MACR	503
MAXIMUM	MAXM	504
MEDIAN	MEDN	505
MEDIUM	MEDM	506
MEGA	MEGA	507
MICRO	MICR	508
MIDDLE	MDLE	509
MINIMUM	MINM	510
MINOR	MNOR	511
MINUTE	MNUT	512
MODERATE	MDRT	513
MOST, MOSTLY	MOST	514
MUCH	MUCH	515
NUMEROUS	NMRS	516
PEBBLE, PEBBLY	PBLE	517
PRIMARY, PRIMARILY	PRIM	518
QUANTITY	QNTY	519
RARE, RARELY	RARE	520
RATIO	RATO	521
REMAINS, REMNANT	REMN	522
RESIDUE, RESIDUAL	RESD	523
SAMPLE	SMPL	524
SAND	SAND	525
SCARCE	SCRC	526
SECONDARY	SCDY	527
SILT	SILT	528
SIZE	SIZE	529
SLIGHT, SLIGHTLY	SLHT	530
SMALL	SMAL	531
SOME	SOME	534
TAPER, TAPERING	TAPR	532
VARIABLE	VRBL	533

Table 3 B 5. Shapes and indurations

Descriptor (Words or Words)	Print Out of Abbreviation	Numeric Code
ACICULAR	ACIC	540
AMORPHOUS	AMOR	541
ANGULAR	ANGL	542
ANHEDRAL	ANHD	543
BLADED, BLADE	BLAD	544
BLOCKY, BLOCK	BLKY	545
BOTRYOIDAL	BTRY	546
BRITTLE	BRTL	547
CAVERNOUS, CAVERN	CAVN	548
COMPACT	CPCT	549
CONCENTRIC	CNCN	550
CONCHOIDAL	CNCH	551
CONSOLIDATED, CONSOLIDATE	CONS	552
DENSE	DNSE	553
DISCOIDAL	DISC	554
ELLIPTICAL	ELIP	555
ELONGATE, ELONGATED	ELNG	556
EQUANT	EQNT	557
EQUIAXIAL	EQAX	558
EUHEDRAL	EUHD	559
FACETED, FACETS	FCET	560
FLAT, FLATTENED	FLAT	561
FRAGMENT, FRAGMENTAL	FRAG	562
FRIABLE	FRBL	563
GLOBULAR, GLOBULE	GLOB	564
HARD	HARD	565
HEDRAL	HDRL	566
HEXAGONAL	HXAG	567
INDURATION, INDURATE, INDURATED	INDR	568
IRREGULAR	IREG	569
LITHOGRAPHIC, LITHIC	LTHC	570
LOOSE, LOOSELY	LOOS	571
MASSIVE	MASS	572
NARROW	NARR	573
OBLATE	OBLT	574
PRISM, PRISMATIC	PRSM	575
PROLATE	PRLT	576
REGULAR, REGULATE	REGL	577
RHOMB, RHOMBIC	RHMB	578
RODSHAPED	RDSH	579
ROUND, ROUNDED	ROND	580
ROUNDNESS	RONS	581
SHAPE, SHAPED	SHPE	582
SHARP	SHRP	583

Table 3 B 5. (cont.)

SOFT	SOFT	584
SPHERICAL, SPHERE	SPHC	585
SPONGY	SPGY	586
TABULAR	TBLR	587
THICK	THCK	588
THIN	THIN	589
TIGHT, TIGHTLY	TGHT	590
TRIAXIAL	TRAX	591
UNCONSOLIDATED	UNCL	592

Table 3 B 6. Fossils

Descriptor (Word or Words)	Print Out of Abbreviation	Numeric Code
ALGAE, ALGAL	ALGE	600
AMMONOID	AMON	601
AMPHIBIAN	AMPH	602
BIOHERM	BIOH	603
BIOSTROME	BIOS	604
BIRD	BIRD	605
BLASTOID	BLAS	606
BORING, BORE	BRNG	607
BRACHIOPOD	BRAC	608
BRYOZOA	BRYO	609
CHITON	CHTN	610
CLAM	CLAM	611
CONODONT	CONO	612
COPROLITE	COPR	613
CORAL	CORL	614
CRINOID, CRINOIDAL	CRIN	615
CYSTOID	CYST	616
DINOSAUR	DINO	617
ECHINOID	ECHN	618
FAUNA	FAUN	619
FISH	FISH	520
FLORA	FLOR	621
FORAMINIFERA	FRMN	622
FOSSIL, FOSSILS	FOSL	623
FOSSILIFEROUS	FSLS	624
FUSULINID	FUSL	625
GASTROPOD	GAST	626
GRAPTOLITE	GRAP	627
INSECT	INSC	628

Table 3 B 6. (cont.)

INVERTEBRATE	INVT	629
MAMMAL	MAML	630
MOLD	MOLD	631
MOLLUSCA	MOLL	632
NAUTILOID	NAUT	633
OSTRACOD	OSTR	634
OYSTER	OYST	635
PELECYPOD	PLCY	636
PELLET	PELL	637
PLANT	PLNT	638
POLLEN	POLL	639
PORCELANEOUS	PORC	640
REPTILE	RPTL	641
SCALE, SCALY, SCALES	SCAL	642
SCAPHOPOD	SCAP	643
SCOLECODONT(s)	SCOL	644
SHARK	SHRK	645
SHELL	SHEL	646
SNAIL	SNAL	647
SPICULE, SPICULAR	SPIC	648
SPINE	SPIN	649
SPONGE	SPNG	650
SPORE	SPOR	651
STROMATOPOROID	STRM	652
TEETH	TETH	653
TOOTH	TOTH	654
TRACKS	TRAK	655
TRAILS	TRAL	656
TRILOBITE	TRIL	657
VERTEBRATE	VERT	658

Table 3 B 7. Compositions

Descriptor (Word or Words)	Print Out of Abbreviation	Numeric Code
ARENACEOUS	ARNS	670
ARGILLACEOUS	ARGS	671
BIOCLASTIC	BIOC	672
CALCAREOUS	CLCR	673
CARBONACEOUS	CRBN	674
CHERTY	CHTY	675
COMPOSITION	CMPS	676
CONGLOMERATIC	CGLT	677
DETRITAL, DETRITUS	DTRL	678

Table 3 B 7. (cont.)

EVAPORITIC, EVAPORITE	EVAP	679
FERRUGINOUS	FRUG	680
FIBROUS	FIBR	681
HETEROGENEOUS	HETR	682
HOMOGENEOUS	HOMO	683
LIMONITIC	LMMO	684
LIMY	LIMY	685
LOAMY, LOAM	LOAM	686
MICACEOUS	MCUS	687
MORTAR	MORT	688
NACREOUS	NACR	689
ORGANIC	ORGN	690
OXIDIZED	OXDZ	691
QUARTZITIC	QTZC	693
QUARTZOSE	QUZS	694
SANDY	SNDY	695
SHALY	SHLY	696
SILICEOUS	SLCS	697
SILTY	SLTY	698
TUFFACEOUS, TUFF	TUFF	699
VITREOUS	VITR	700

Table 3 B 8. Lusters

Descriptor (Word or Words)	Print Out of Abbreviation	Numeric Code
BRIGHT	BRIT	710
CLEAR	CLER	711
EARTHY, EARTH	ETHY	712
FLUORESCENT	FLUR	713
FROSTED	FROS	714
GLASSY, GLASS	GLSY	715
GLOSSY, GLOSS	GLOY	716
GREASY	GRSY	717
LUSTER, LUSTROUS	LSTR	718
MOTTLED, MOTTLING, MOTTLE	MTLD	719
OILY	OILY	720
POLISH, POLISHED	PLSH	721
RESINOUS	RSNS	722
SILKY	SLKY	723
SOAPY	SOPY	724
SOOTY	SOTY	725
SPECK, SPECKLED	SPEC	726
SPOTTED, SPOT, SPOTTY	SPOT	727

Table 3 B 8. (cont.)

STAINED, STAIN, STAINING	STAN	728
STIPPLED, STIPPLE	STIP	729
STREAK, STREAKED	STRK	730
TRANSLUCENT	TRNS	731
TRANSPARENT	TRPT	732
VELVETY	VELV	733
WAXY	WAXY	734
WEATHERED, WEATHER	WTHR	735

Table 3 B 9. Colors

Descriptor (Word or Words)	Print Out of Abbreviations	Numeric Code
AMBER	AMBR	795
BLACK, BLACKISH	BLCK	796
BLUE, BLUISH	BLUE	797
BROWN, BROWNISH	BRWN	798
BUFF	BUFF	799
CHOCOLATE	CHOC	800
COLOR, COLORED	COLR	801
CREAM	CREM	802
DARK	DARK	803
DUSKY	DSKY	804
GRAY, GRAYISH	GRAY	805
GREEN, GREENISH	GREN	806
INDIGO	INDG	807
IRRIDESCENT	IRID	808
KHAKI	KHAK	809
LAVENDER	LAVN	810
LIGHT, LIGHTER	LIHT	811
MAROON	MRON	812
OCHRE	OCHR	813
OLIVE	OLIV	814
OPAQUE	OPAQ	815
ORANGE	ORNG	816
PALE	PALE	817
PINK, PINKISH	PINK	818
PURPLE	PURP	819
RED, REDDISH	RED	820
RUSTY, RUST	RUST	821
TAN	TAN	822
VARICOLORED	VCOL	823
VARIEGATED	VGAT	824
VIOLET	VIOL	825
WHITE	WHIT	826
YELLOW, YELLOWISH	YELW	827

Table 3 C. Rock color chart character descriptors

Rock Chart Characters	Code	Rock Chart Characters	Code	Rock Chart Characters	Code
5R	740	N 6	760	6/6	780
10 R	741	N 7	761	7/1	781
5 YR	742	N 8	762	7/2	782
10 YR	743	N 9	763	7/4	783
5 Y	744	2/1	764	7/6	784
10 Y	745	2/2	765	8/1	785
5 GY	746	2/6	766	8/2	786
10 GY	747	3/2	767	8/4	787
5 G	748	3/4	768	8/6	788
10 G	749	4/1	769	9/1	789
5 BG	750	4/2	770		
5 B	751	4/4	771		
5 PB	752	4/6	772		
5 P	753	5/1	773		
5 RP	754	5/2	774		
N 1	755	5/4	775		
N 2	756	5/6	776		
N 3	757	6/1	777		
N 4	758	6/2	778		
N 5	759	6/4	779		

Example:

Grayish orange pink on the rock chart is 10 R 8/2. The numeric code is 7 4 1 7 8 6. For dark reddish brown the rock chart is 10 R 3/4 and the numeric code is 7 4 1 7 6 8.

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