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U. S. GEOLOGICAL SURVEY

CHARLES D. WALCOTT, Director

DRILLER'S NOTEBOOK

WELL RECORD

6—451

SUGGESTIONS TO DRILLERS.

1. Samples should be taken from each bed passed through, and never more than 20 feet apart, even in the same bed.
2. Samples from wells in sands and clays should not be washed, as washed samples of sandy clay show only clean sand and give a wrong idea of the character of the bed.
3. All oyster, clam, or other fossil shells should be placed in the bags with the dirt or sand in which they are found, and marked with the depth from which obtained.
4. Samples should be dry before being mailed.
5. A blank label will be found in each bag. After it is filled out it should be folded once to protect the writing.
6. Bags should be tied securely and mailed. They require no postage.
7. In the first two or three samples sent in, the "Location" should be filled out with care; in the succeeding samples so much care need not be taken with location, but the rest of the card should be complete.
8. Note depth and thickness of all water-bearing layers.
9. Note under "Remarks" the quality of the water from each layer: as hard, soft, salty, alkaline, or sulphur bearing.
10. Note height to which water from each layer rises in well, and give flow in gallons per minute.
11. Make frequent use of the "Remarks" column to explain your notes.
12. If you leave the rig, send in your notebook, with the name of your successor, and a new book will be sent to him.
13. If you do not understand what is wanted, or desire information on any point, write to this office, using one of the envelopes sent with the first shipment of bags. They require no postage.
14. It sometimes happens that unauthorized persons represent themselves as members of the Survey. If you desire to know whether a man is connected with the Survey, ask for his identification card, which is signed by the Secretary of the Interior and the Director of the Geological Survey.

Names of owners and drillers who furnish records and samples will appear in the annual publication of the Geological Survey on well borings.

The Survey desires to assist and cooperate with owners and drillers in every way possible, and will be glad to answer questions.

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WELL RECORD.

Well is located _____ *miles in a* _____ *direction*
from _____ (Post office.) *in* _____ (State.), *in the*
_____ *¼ of* _____ *¼ of Sec.* _____ *Twp.* _____ *Range* _____
(In States having public-land surveys.)

Owner, _____

Contractor, _____

Drillers, _____

Well begun _____, *190* ; *completed* _____, *190*

Rig used—cable, rotary, jet, or _____

Maker, _____

Diameter of well at mouth, _____ (Inches.); *at bottom,* _____ (Inches.)

Depth of well, _____ (Feet.); *Length and size of casing,* _____

_____

WATER WELLS.

Water at _____ (Depths in feet.); *Main supply at* _____ *ft.*

How near surface will water rise? _____ *ft.*

If flowing, how high will water rise above surface? _____ *ft.*

Is well pumped? _____; *Yield,* _____ (Gallons per minute.)

OIL AND GAS WELLS.

Product, _____ (Oil or gas.); *Pool or district,* _____

Well No. _____ *on* _____ *farm.*

Oil yield first 24 hours, _____ *bbls.*

Gas pressure, _____ *pounds after* _____ (Minutes closed.)

Name of sand, _____

_____

_____

_____

Recorded by _____

Address, _____

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Sample No.	Rock or Material.	Color.	Hard or Soft.	From—	To—	Remarks. (See paragraph 8 on inside front cover.)
	Orange City	1120				
	Twin Lakes	1105				
	Lake Helen	1125				
	about 1 mile east Lake Helen a flat scrubby sand country for about 1 mile, 1120, then we run in to a flat pine woods type with many cypress ponds this a flow might be obtained here					
	Turpentine still	1110				
	12 mi. New Smyrna	1110				
	Indian Springs 10 m.p.	1110				
	Glencoe	1100				
	17 Bad Swamps	1090				
						4 mi N. Indian Spgs, + flowing well, Owner, 1909 Gamble, irrigation, 260 ft. deep, 4 in. on Spruce Creek and goes across creek another well, same owner.
						About 4 mi west could not get flows. on flat woods; well was only 80 ft.

Sample No.	Rock or Material.	Color.	Hard or Soft.	From—	To—	Remarks. (See paragraph 8 on inside front cover.)

GEOLOGIC NOTES.

In a simple classification rocks may be grouped into three divisions: (1) sedimentary, (2) metamorphic, and (3) igneous.

Sedimentary rocks.—Sedimentary rocks are formed of fragments worn from older rocks by the action of rain, wind, frost, etc. Such materials were carried by water or glaciers until deposited as beds of clay, sand, gravel, marl, etc. Other deposits consist largely of corals, or of shells, such as oysters and clams. When first deposited the materials are loose and unconsolidated, but they become gradually hardened and cemented together, especially when covered by later beds, and form solid rocks.

Metamorphic rocks.—Sedimentary rocks have frequently been subjected to heat and pressure, which have further hardened them, or even produced a crystalline texture. Sediments and igneous rocks so altered are known as metamorphic rocks. Mica schist and marble are typical examples. They generally retain a bedded or banded structure.

Igneous rocks.—Igneous rocks have come from the earth's interior in a molten state and have forced their way between other rocks or have overflowed as lava beds at the surface. They are nearly all more or less crystalline in texture.

Resemblance of rocks of different ages.—Rocks of the types indicated above occur the world over, those of one locality often being indistinguishable from those of another. Notwithstanding this, there may be a difference of thousands of years in age, and a great variance in conditions of formation. It is not warrantable, therefore, to say that because a rock in California has the same composition as an oil-bearing rock in Ohio it is of the same age and will yield petroleum.

Fossils.—In sedimentary rocks remains of animals and plants are often found. These generally consist of portions or impressions of shells, skeletons, or leaves, and are known as fossils. A bed can frequently be recognized and its age determined by fossils. It is of great importance that all fossils be saved. The Survey will be glad to identify these for well owners or drillers.

Definition of a formation.—A rock or succession of rocks possessing a uniformity of character throughout a considerable area is termed a formation, and is given a name, such as Trenton limestone, etc. The importance of identifying these is great and their identification will be much facilitated by the preservation of samples.

Structure.—When deposited, sedimentary beds are nearly horizontal. Subsequently they have often been thrown into inclined positions, or bent into wave-like folds, the arches of which are known as *anticlines* and the troughs as *synclines*. When the beds are further disturbed they may become broken and the different parts displaced or *faulted* from their original position. The slope of the beds is known as the *dip*, and the direction in which they extend, or would outcrop on a horizontal surface, is known as the *strike*. The directions of strikes and dips are of importance in studying the occurrence of water and oil, and should be recorded whenever possible.

DEFINITIONS OF ROCKS.

In order to assist the driller in keeping records, brief definitions of the more common rock terms are given below.

UNCONSOLIDATED DEPOSITS.

Soil and subsoil.—The weathered upper portions of any rocks or materials.

Till.—An irregular mixture of clay, sand, and bowlders deposited by glaciers.

Alluvium.—Sand, clay, etc., deposited by streams.

Gravel, sand, and clay.—Made up respectively of pebbles, sand grains, and finer particles.

Chalk.—A soft, white, earthy substance made up of fine particles of lime.

Marl.—A clayey substance containing much lime.

SEDIMENTARY ROCKS.

Sedimentary rocks are made up of fragments of older rocks. The fragments or grains are usually rounded, a feature which helps to distinguish them from igneous rocks.

Conglomerate.—Consolidated gravel.

Sandstone.—A consolidated sand. It is said to be *massive* if there are few bedding planes, and *shaly* if it splits into plates.

Quartzite.—A sandstone in which the spaces between the grains have filled with a hard cement (silica), forming an excessively hard rock.

Shale.—Consolidated clay; a soft, fine-grained rock which tends to split into thin plates (often improperly called soapstone).

Slate.—Like shale, but harder; splits into thin plates which may or may not coincide with the bedding. The tendency to split is not often recognized in drilling. Example: roofing slate.

Limestone.—Formed from consolidated marly beds, or from beds of coral, shellfish, etc. It is composed mainly of carbonate of lime, but often contains sand and other impurities, and is often very hard. It can be most readily detected by the bubbling which takes place when it is touched with muriatic acid.

Flint, rock salt, gypsum, coal.—These are too well known to require definition.

Concretions.—Hardened lump-like masses within the rock, and should not be confounded with real bowlders.

METAMORPHIC AND IGNEOUS ROCKS.

These rocks are generally made up of angular crystals often recognizable by their glistening faces, a feature which is not often possessed by the fragments of sedimentary rocks.

Marble and dolomite.—*Marble* is a crystalline limestone, and gives the same reaction with acid as limestone, marl, and chalk. *Dolomite* resembles limestone, but the bubbling with acid is strong only when the acid is hot. In composition it differs from limestone and marble in that it contains carbonate of magnesium.

Soapstone or talc.—Fairly soft and greasy to the touch. It is seldom encountered in drilling, the substance called soapstone usually being a soft shale, although the name is sometimes incorrectly applied to clay or slate.

Schist.—A crystalline rock characterized by thin layers of mica or other mineral.

Gneiss.—A rock intermediate in character between schist and granite.

Granite.—A crystalline rock composed of quartz, feldspar, and other minerals.

Trap.—A very dark crystalline rock of igneous origin.

WHEN RECORD IS COMPLETED TIE STRING AROUND THIS BOOK AND MAIL.

Department of the Interior
U. S. GEOLOGICAL SURVEY

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