

NORTH CAROLINA GEOLOGICAL SURVEY
REPOSITORY of CORE, CUTTINGS, and WELL LOGS

OPEN FILE REPORT 88-1

BY

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GEOLOGICAL SURVEY SECTION

The Geological Survey Section shall by law "...make such examination, survey, and mapping of the geology, mineralogy, and topography of the state, including their industrial and economic utilization as it may consider necessary."

In carrying out its duties under this law, the section promotes the wise conservation and use of mineral resources by industry, commerce, agriculture, and other governmental agencies for the general welfare of the citizens of North Carolina.

The section conducts a number of basic and applied research projects in environmental geology, mineral resource exploration, mineral statistics, and systematic geologic mapping. Services constitute a major portion of the section's activities and include identifying rock and mineral samples submitted by the citizens of the state and providing consulting services and specially prepared reports to other agencies that require geological information.

The Geological Survey Section publishes results of research in a series of Bulletins, Economic Papers, Information Circulars, Educational Series, Geologic Maps, and Special Publications. For a complete list of publications or more information about the section please write: Geological Survey Section, P.O. Box 27687, Raleigh, North Carolina 27611.

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INTRODUCTION

The North Carolina Geological Survey repository of core, cuttings, and well logs is a facility that contains a valuable collection of samples and data obtained from a variety of drilling projects over many years. This considerable and important resource is available for use by the public and by State and Federal agencies. It is regularly used by geotechnical engineering firms, mineral and petroleum exploration companies, hydrologists studying groundwater supply and contamination, and university researchers. The repository is also used extensively by Geological Survey staff to respond to inquiries and for research.

Repository acquisitions have been mostly by donation, either from State or Federal agencies or by private firms. State regulations require operators of oil and gas exploration wells to provide the State with samples, geophysical logs, and certain other information from their drilling.

This report is intended to acquaint the reader with the Geological Survey's purpose in maintaining the repository, the kinds of geologic and geophysical materials which it contains, and to provide an overview of how these materials are cataloged and accessed.

BACKGROUND

Wells and borings are made for exploration, evaluation, and development of resources such as groundwater, minerals, or oil and gas. They are also used for geotechnical site assessments and geologic research.

Drilling is a costly method of obtaining subsurface information. A single borehole or well may cost up to thousands or tens of thousands of dollars. Deep oil test wells typically cost hundreds of thousands of dollars to several million dollars to drill. A well organized and readily available database of subsurface information can help maximize the

information gained from drilling by providing advance information that will enable a company or agency to better locate their drill site; to narrow their geologic objectives; or even, in some cases, to avoid drilling altogether.

During and after drilling, geologists examine the products of drilling, namely rock samples and chart recordings called geophysical logs. One type of sample is called cuttings. These are chipped off by a rotating drill bit and then raised to the surface by a circulating fluid. Another type of sample, called core, is a continuous cylinder of rock up to several inches in diameter which is collected mainly in mineral exploration. Core samples best represent the subsurface geology at a given location; however, they are also the most costly to acquire. Geophysical logs are derived from sensors lowered into open boreholes by a cable. They record various quantitative and qualitative rock properties that are utilized by geologists in their interpretations.

Accurate and complete interpretation of the geology in a given area, especially where the rocks are flat lying such as in the Coastal Plain province, requires the integration of core, cuttings, and geophysical log data. Thus the acquisition, storage, and curation of such data are important to developing and understanding the regional as well as the local three-dimensional geologic framework of North Carolina. Such an understanding is fundamental to any geologically related pursuit including groundwater evaluation and management, mineral resources exploration and development, geotechnical evaluations (which includes hazardous and toxic waste site studies), and assessment for geological hazards such as slumping, landslides, and sinkholes.

FACILITY

The repository currently houses a collection of over 11,000 feet of core and approximately 365,000 feet of cuttings. Most of the core has been

reduced in volume or skeletonized because of space constraints, but it remains an invaluable record of the rocks penetrated.

Over 1250 geophysical logs are contained in the repository files. These are mainly from water wells, but include about 250 logs from oil and gas drilling. Base maps showing locations of wells and boreholes (1:250,000 scale or 1 inch equals approximately 4 miles) are available as a separate North Carolina Geological Survey publication (Open-File Report 88-2).

The repository is part of the Geological Survey's Coastal Plain Office in Raleigh (see Figure 2). This is a 2700-square-foot facility with about 1500 square feet of warehouse space dedicated to sample and data storage. The adjacent finished office and laboratory space is occupied by five staff who are available, as their ongoing duties permit, to answer questions and assist visitors. Limited space is available for visitors within the warehouse area for data examination.

Examination supplies are principally the responsibility of the user. A binocular microscope is available for visitors and photocopy services (fee) are also available. Material is loaned under certain circumstances.

Approximately 50 percent of the holdings are the result of water well drilling within the Coastal Plain region, approximately 20 percent represent oil and gas exploration in North Carolina, and 20 percent of the repository holdings are from the mineral exploration in the Piedmont and the western part of the state. The remaining 10 percent are derived from geologic research and geotechnical studies. Among the latter are cores from North Carolina's Superconducting Super Collider proposal. The facility currently accepts new material from oil and gas test wells (mandatory), and from other sources, chiefly groundwater drilling in the Coastal Plain, as the limited space allows.

DATA ORGANIZATION AND ACCESS

Persons wishing to use the facility may telephone, write, or visit (see Figure 2). The flow chart illustrates how one may access the database. Specific data of interest may be identified either from base maps or computer files prior to inspection.

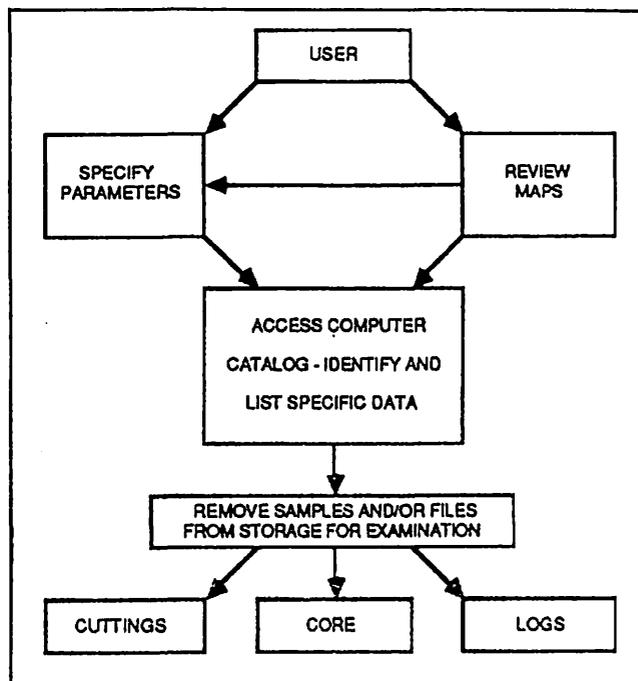


Figure 1 - Flow chart.

The database is available as a printed catalog, or on computer diskette (dBase III Plus©) upon request. Their cost will vary depending on the number of records contained in the output file. A listing is available for:

- the entire database,
- individual counties, or
- prescribed parameters.

Figure 3 shows examples of database records and Table 1 explains the database structure. The computer catalog consists of four database files which group similar holes into the following categories:

- **WELLDATA** - Contains records of Coastal Plain wells and boreholes for which the Geological Survey has samples and/or geophysical log data. These wells include domestic, municipal, and industrial water wells; mineral exploration core holes; and stratigraphic tests.

- **OILTEST** - Contains records of oil and gas exploration wells drilled in North Carolina.

- **TRIASSIC** - Contains records of rotary and core drill holes located within the Triassic basins of North Carolina.

- **HARDROCK** - Contains records for Piedmont and mountain region drilling. These are primarily core holes related to mineral exploration.

Those wishing to review repository data should contact the facility. On-site inspection and study, without fee, is available with prior appointment. A proposal and borrowing agreement, which includes a provision for sharing derivative data, are required from anyone wishing to borrow materials.

SUMMARY

The North Carolina Geological Survey's collection of geological and geophysical data is an important resource. Its continued use, growth, and maintenance will increase our capability, through continued study and research, to successfully manage North Carolina's natural and environmental resources.

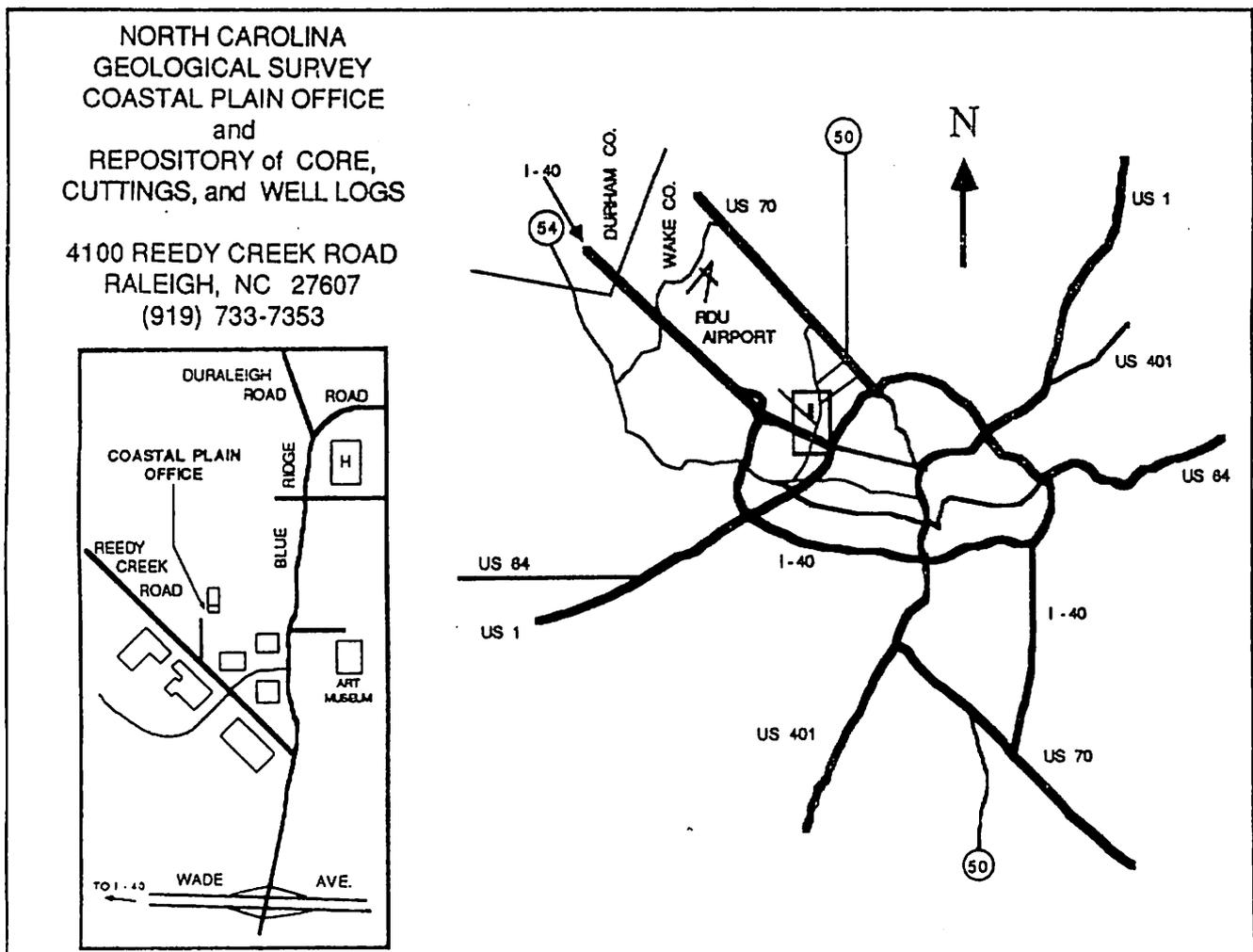


Figure 2 - Map of Raleigh area showing location of the North Carolina Geological Survey Coastal Plain Office and repository of core, cuttings, and well logs.

NCGS CODE: BF-T-1-68 OTHER CODE: GW GRID: P-21, k-5
 COUNTY: BEAUFORT WELL NAME: BATH RESEARCH STA. OPERATOR: NCGWS
 DEPTH: 919 WELL DATUM: 35 LATITUDE: 352230 LONGITUDE: 7705230
 DRILLED BY: NCGWS DATE DRILLED: 08/07/68
 LOGGED BY: NCGWS DATE LOGGED: 08/07/68
 LOGS: E,G SAMPLES: T SLIDES: T LITH LOG: F
 CUTTINGS: T INTERVAL: 0/919 U,W CORE: T INTERVAL: 69/162 (4 BX)
 SIDE WALL CORES: F INTERVALS:

Figure3a - An example of a WELLDATA record.

NCGS CODE: DR-OT-1-46 OTHER CODE: 32-055-00001 GW GRID:
 COUNTY: DARE WELL NAME: HATTERAS LIGHT # 1 OPERATOR: STANDARD OIL OF NJ
 DEPTH: 10054 WELL DATUM: 24 LATITUDE: 351500 LONGITUDE: 753145
 DRILLED BY: DATE DRILLED: 07/09/46
 LOGGED BY: SCHLUMBERGER DATE LOGGED: 07/09/46
 LOGS: E SAMPLES: T SLIDES: F LITH LOG: F
 CUTTINGS: T INTERVAL: 18/10054 U CORE: T INTERVAL: 480/10054 (5 BX)
 SIDE WALL CORES: F INTERVALS:

Figure3b - An example of an OILTEST record.

NCGS CODE: LE-OT-2-83 OTHER CODE: 32-105-00004 GW GRID:
 COUNTY: LEE WELL NAME: BOBBY HALL #1 OPERATOR: SEPCO
 DEPTH: 4610 WELL DATUM: 352 LATITUDE: 352809 LONGITUDE: 791425
 DRILLED BY: FALCON DRILLING DATE DRILLED: 07/06/83
 LOGGED BY: NCGS, SCHLUMBERGER DATE LOGGED: 07/06/83
 LOGS: I-G,SNP-G-CAL,T,ML,G SAMPLES: T SLIDES: F LITH LOG: F
 CUTTINGS: T INTERVAL: 0/4610 U CORE: F INTERVAL:
 SIDE WALL CORES: T INTERVALS: 2566,2670,2988

Figure3c - An example of a TRIASSIC record.

NCGS CODE: CV-C-1-83 OTHER CODE: TOL-11 GW GRID:
 COUNTY: CLEVELAND WELL NAME: OPERATOR: BILLITON MINERALS
 DEPTH: 779 WELL DATUM: 670 LATITUDE: 351339 LONGITUDE: 813719
 DRILLED BY: DATE DRILLED: 00/00/83
 LOGGED BY: DATE LOGGED:
 LOGS: SAMPLES: T SLIDES: F LITH LOG: F
 CUTTINGS: F INTERVAL: CORE: T INTERVAL: 30/779 (74 BX)
 SIDE WALL CORES: F INTERVALS:

Figure 3d - An example of a HARDROCK record.

Figure 3 - Examples of typical database records. See Table 1 for further explanation of the field labels and entries for the respective database files. Some field labels are spelled out in this figure for clarity; column one of Table 1 shows the actual database field labels.

| FIELD NAME | WELLDATA | OILTEST | TRIASSIC | HARDROCK |
|------------------|--------------------------------|--------------------------------|-----------------------------------|--------------------------------|
| NCGS CODE | NCGS WELL CODE | NCGS WELL CODE | NCGS WELL CODE | NCGS WELL CODE |
| OTHER CODE | OPERATOR CODE | API NUMBER | API NUMBER/OPERATOR CODE | OPERATOR CODE |
| GW GRID | NC GROUNDWATER SECTION CODE | | | |
| COUNTY | COUNTY | COUNTY | COUNTY | COUNTY |
| WELL NAME | VARIOUS | LEASE NAME & HOLE # | LEASE NAME & HOLE #/PROJECT NAME | PROJECT NAME |
| OPERATOR | OPERATOR | OPERATOR | OPERATOR | OPERATOR |
| DEPTH | TOTAL DEPTH OF HOLE (FEET) | TOTAL DEPTH OF HOLE (FEET) | TOTAL DEPTH OF HOLE (FEET) | TOTAL DEPTH OF HOLE (FEET) |
| WELL DATUM | GROUND LEVEL ELEVATION (FEET) | KELLY BUSHING ELEVATION (FEET) | GROUND LEVEL/KELLY BUSHING (FT.) | GROUND LEVEL ELEVATION (FEET) |
| LATITUDE | LATITUDE COORDINATE | LATITUDE COORDINATE | LATITUDE COORDINATE | LATITUDE COORDINATE |
| LONGITUDE | LONGITUDE COORDINATE | LONGITUDE COORDINATE | LONGITUDE COORDINATE | LONGITUDE COORDINATE |
| DRILLED BY | DRILLING CONTRACTOR | DRILLING CONTRACTOR | DRILLING CONTRACTOR | DRILLING CONTRACTOR |
| DATE DRILLED | COMPLETION DATE (MM/DD/YY) | COMPLETION DATE (MM/DD/YY) | COMPLETION DATE (MM/DD/YY) | COMPLETION DATE (MM/DD/YY) |
| LOGGED BY | GEOPHYSICAL LOGGING CONTRACTOR | GEOPHYSICAL LOGGING CONTRACTOR | GEOPHYSICAL LOGGING CONTRACTOR | GEOPHYSICAL LOGGING CONTRACTOR |
| DATE LOGGED | GEOPHYSICAL LOGGING DATE | GEOPHYSICAL LOGGING DATE | GEOPHYSICAL LOGGING DATE | GEOPHYSICAL LOGGING DATE |
| LOGS | GEOPHYSICAL LOGS IN NCGS FILES | GEOPHYSICAL LOGS IN NCGS FILES | GEOPHYSICAL LOGS IN NCGS FILES | |
| * SAMPLES | SAMPLES | SAMPLES | SAMPLES | SAMPLES |
| * SLIDES | PALEONTOLOGIC SLIDES | PALEONTOLOGIC SLIDES | PALEONTOLOGIC SLIDES | |
| * LITH LOG | LITHOLOGIC LOG | LITHOLOGIC LOG | LITHOLOGIC LOG | LITHOLOGIC LOG |
| * CTGS | CUTTINGS | CUTTINGS | CUTTINGS | |
| CTGS INTERVAL(S) | CUTTINGS INTERVAL(S) | CUTTINGS INTERVAL(S) | CUTTINGS INTERVAL(S) | |
| * CORE | CORE | CORE | CORE | CORE |
| CORE INTERVAL(S) | CORE INTERVAL(S) | CORE INTERVAL(S) | CORE INTERVAL(S) | CORE INTERVAL(S) |
| * SWC | SIDE WALL CORE(S) | SIDE WALL CORE(S) | SIDE WALL CORE(S) | |
| SWC INTERVAL(S) | SIDE WALL CORE INTERVAL(S) | SIDE WALL CORE INTERVAL(S) | SIDE WALL CORE INTERVAL(S) | |

* LOGIC FIELD - Entry is "T" if yes or "F" if no

ADDITIONAL EXPLANATION:

NOTE: In the database, fields are completed to the extent the information is known; most older wells and boreholes have incomplete documentation. Blank fields indicate that the information is either unknown or not applicable.

NCGS CODE: An alpha-numeric code applied to all NCGS well and borehole data. The format is: COUNTY - TYPE OF HOLE - SEQUENCE # WITHIN THE YEAR DRILLED - YEAR DRILLED. For type of hole: A = auger, C = core, OT = oil and gas test, and T = unspecified test hole.

GW GRID: A latitude-longitude-based grid utilized by the North Carolina Groundwater Section, Division of Environmental Management, to identify wells and boreholes within one minute quadrangles.

LITH LOG: An affirmative entry requires a good quality, detailed, documented descriptive and graphic log.

CTGS INTERVAL(S): The interval(s), measured in feet, represented by cuttings. "U" and "W" indicate unwashed and/or washed sets, respectively.

CORE INTERVAL(S): The interval(s), measured in feet, represented by core samples and the volume of core (in number of boxes). Boxes typically hold 8 or 10 feet of core each.

Table 1 - Database structure and explanation of field entries for the respective database files described on page 3.