

by John P. Blumel¹, Sidney B. Anderson¹, John A. Andrew², David W. Fischer¹, and Julie A. LeFever¹

Main stratigraphic column table with columns: AGE (MILLIONS OF YEARS), ERA, PERIOD, SEQUENCE, ROCK UNIT (GROUP, FORMATION, MEMBER), MINERAL RESOURCES, ROCK COLUMN, MAX THICK. (FEET (METRES)), LITHOLOGY, DEPOSITIONAL ENVIRONMENTS AND OTHER CHARACTERISTICS.

STRATIGRAPHIC COLUMN EXPLANATION

The three left-hand columns (age, era, period) on this Stratigraphic Column represent continuous geologic time. The age column lists, in millions of years before the present, generally accepted ages of time-unit boundaries. The age approximations do not necessarily refer to the ages of the oldest materials lying on materials of the next older period in North Dakota, but rather, to generally cited world-wide ages of the time-unit boundaries. Colors in the period column are those conventionally used to characterize each geologic period.

The sequence, rock unit (group-formation-member), and pictorial rock columns represent the discontinuous geologic record, the preserved sedimentary section from which we can interpret the geologic history of North Dakota.

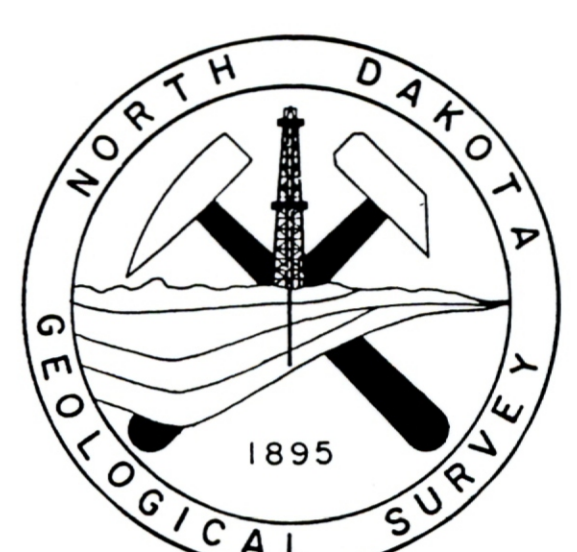
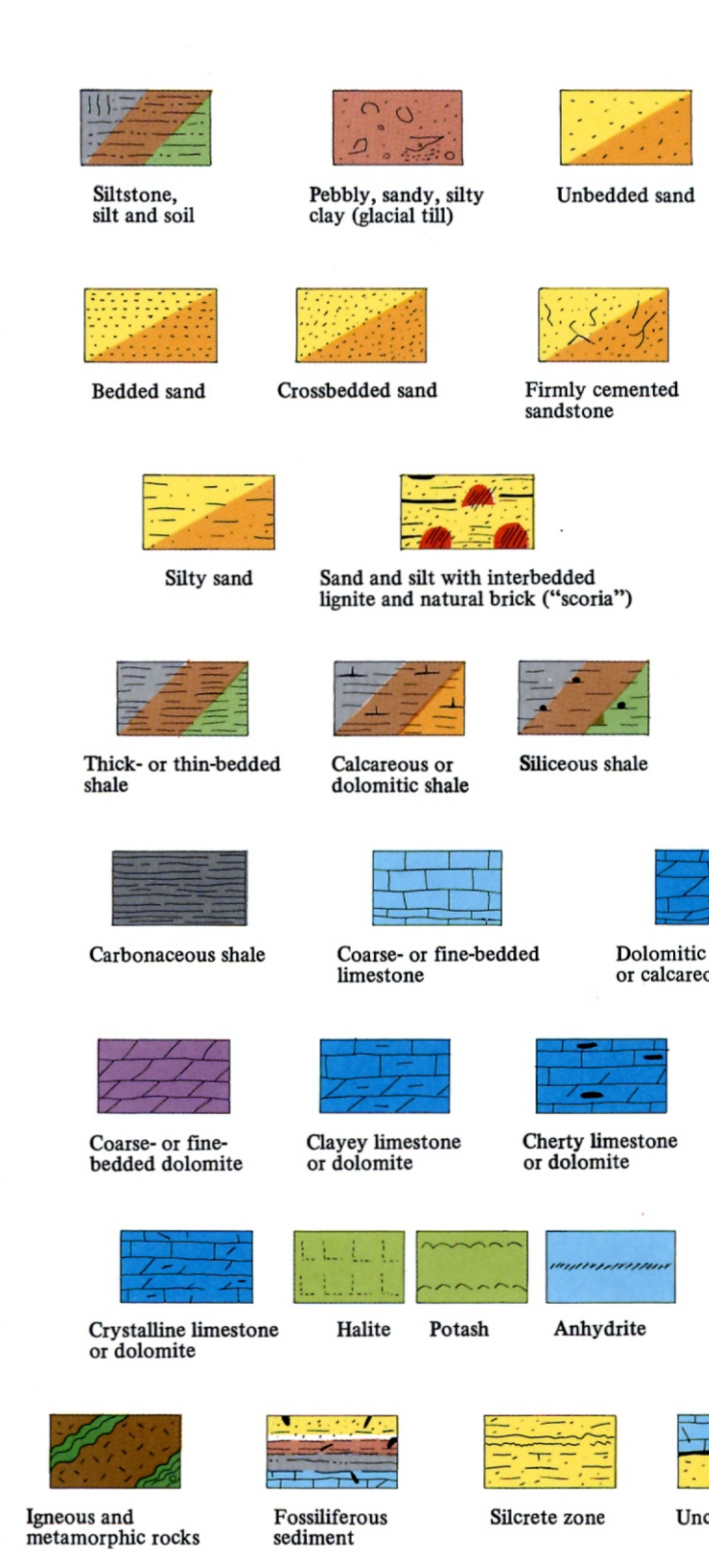
Unconformities are shown on the rock column by wavy, horizontal lines; major unconformities are marked by heavier lines than the less significant ones. Major unconformities subdivide the Stratigraphic Column into six units (sequences) that can be identified, where they are preserved, in cratonic interior areas of North America.

The etched right-hand side on the rock column represents relative resistance to weathering of the rocks exposed in North Dakota. Colors on the rock column are used in conjunction with lithologic symbols to help in distinguishing lithology (see accompanying Rock Column Legend). Generally, conventional lithologic colors are used for materials that are known only from drill-hole data. Carbonates are shown as shades of blue, sands or sandstones as yellow, and shales as colors approximating the actual rock color.

The mineral resources column emphasizes the economic importance of certain rock units. Mineral resources presently or previously produced in North Dakota are noted in black. Known resources not yet utilized are noted in blue.

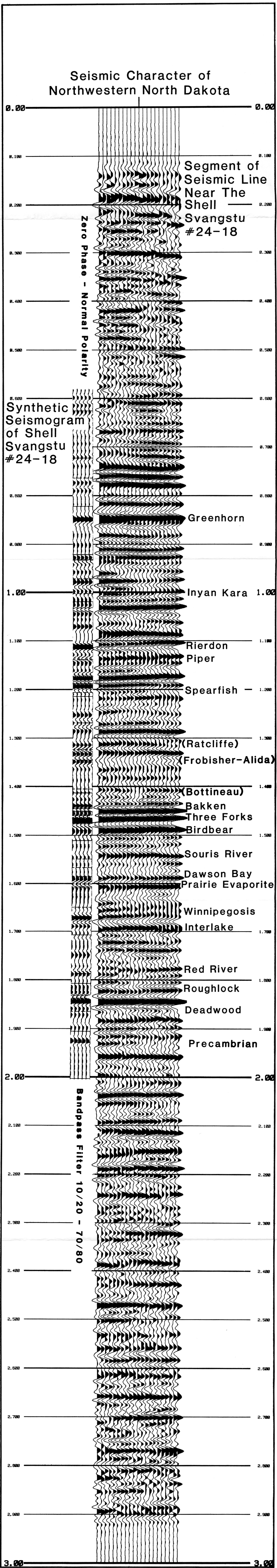
1. North Dakota Geological Survey 2. Strateisec, Inc.

ROCK COLUMN LEGEND



REPRESENTATIVE GEOPHYSICAL LOGS
 EXPLANATION

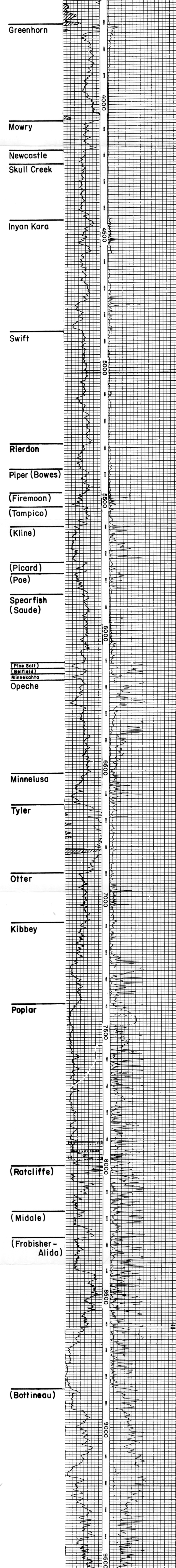
Wireline well logs and a small portion of a seismic line are reproduced on sheets 2 and 3 to illustrate log characteristics of the subsurface rock units included on the Stratigraphic Column (sheet 1). Logs representative of various parts of the Williston Basin in North Dakota are included (see the inset map for the locations of the wells used). Wells used include: locations on the eastern edge of the basin (Estate of John Black-Miller No. 1 in Ramsey County and Wise Oil-Wise 2-Weigel No. 1 in Logan County); the north-central part of North Dakota (Union-Steen No. 1 in Bottineau County); the east-central part of the basin (Humm-Emma Klevan No. 1 in Burleigh County); near the center of the basin (Gulf-Zabolotny No. 1-3-4A in Billings County—the deepest well drilled in the Williston Basin at the time the Stratigraphic Column was compiled); from the Nesson Anticline (Amerada-Boe-Olsen No. 1 in Williams County); the northwest corner of North Dakota (Shell-Svangstu No. 24-18 in Divide County—a synthetic seismogram, prepared from the sonic log, and a portion of a nearby seismic line are also included at this location); and southwestern North Dakota near the Cedar Creek Anticline (Striker-Ruppert No. 1 in Bowman County). Also included is a wireline well log from Slope County in southwestern North Dakota (North Dakota State Water Commission test-hole No. 4811) to illustrate log characteristics of a part of the Tertiary and upper Cretaceous section. Tops for formations, members, and log markers are indicated on the logs where they are readily recognized. The omission of these tops or markers on the logs does not necessarily mean the units are absent.



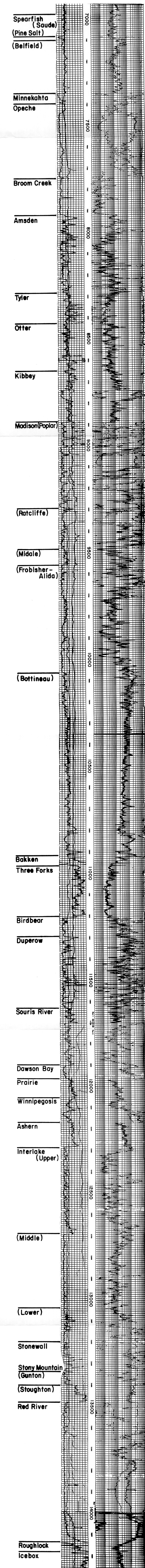
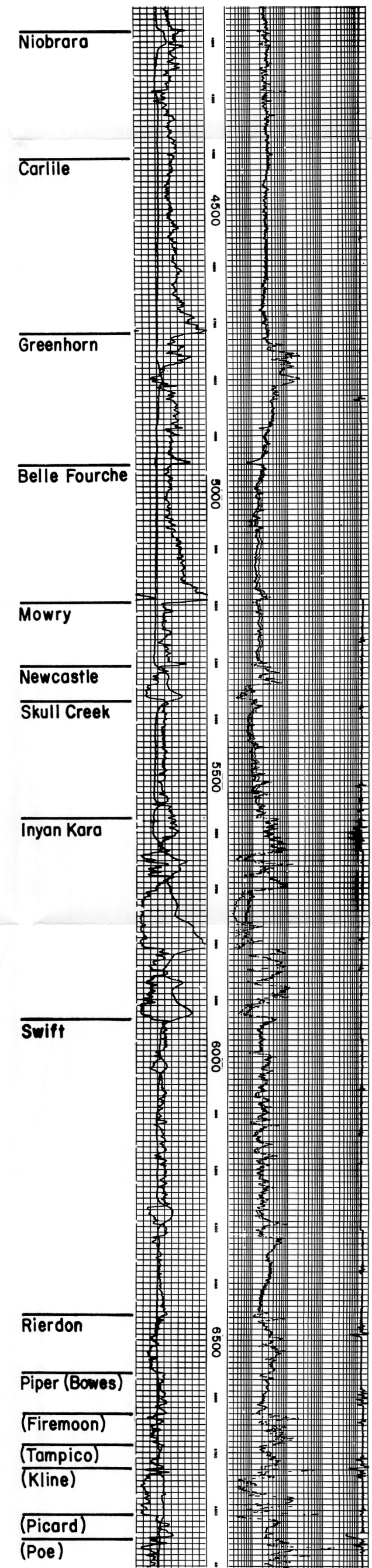
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 SHELL OIL
 SVANGSTU 24-18
 SE 1/4 SW 1/4
 SEC. 18, T. 163N., R. 95W.
 DIVIDE COUNTY



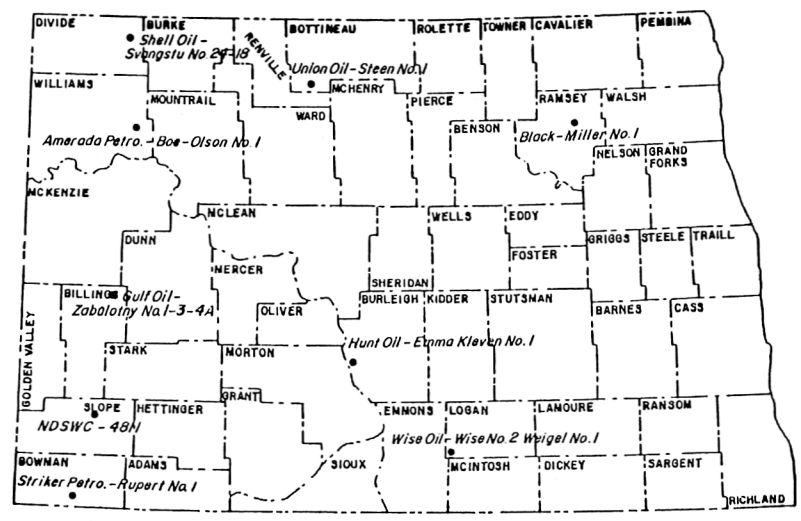
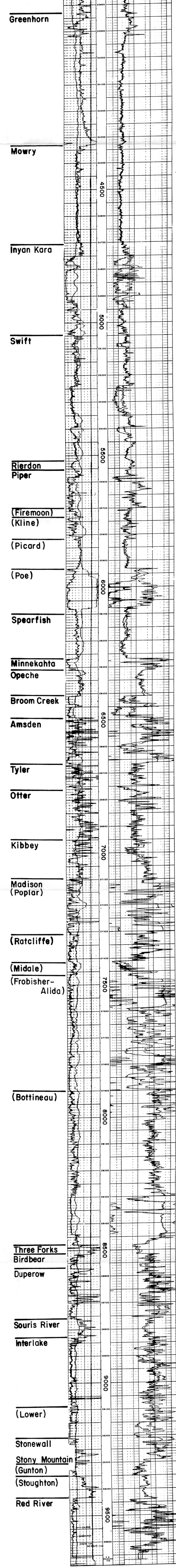
NDGS-1403
 AMERADA PETROLEUM
 BOE-OLSON NO. 1
 SW 1/4 NE 1/4
 SEC. 15, T. 155N., R. 96W.
 WILLIAMS COUNTY

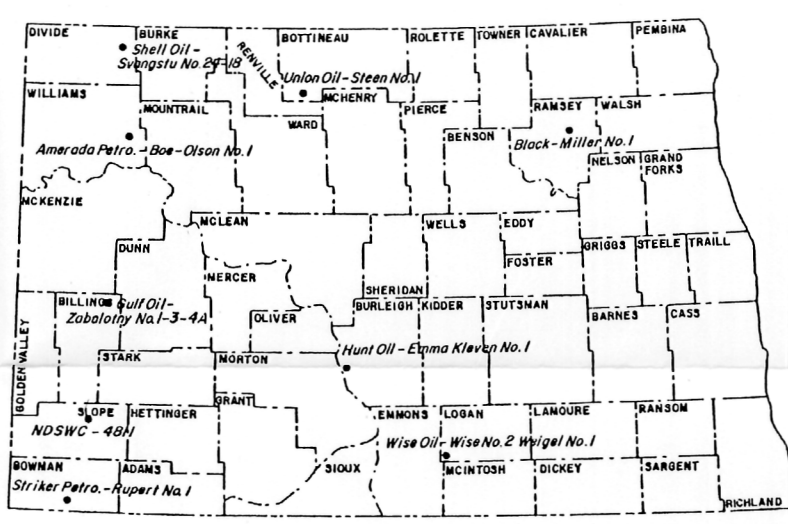
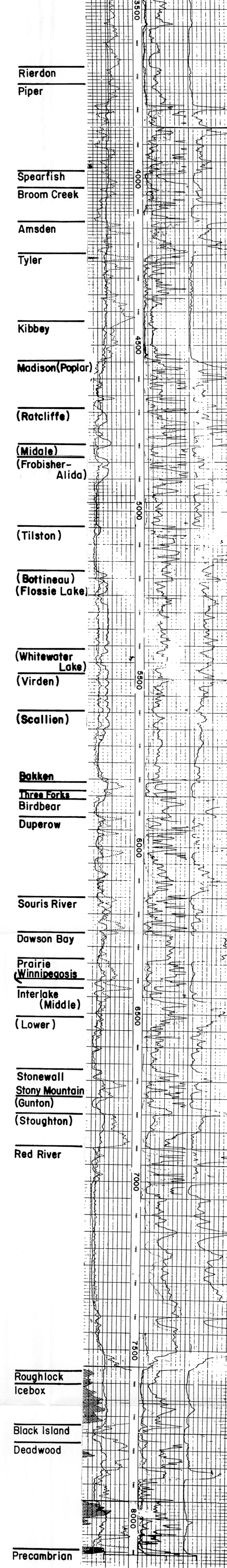
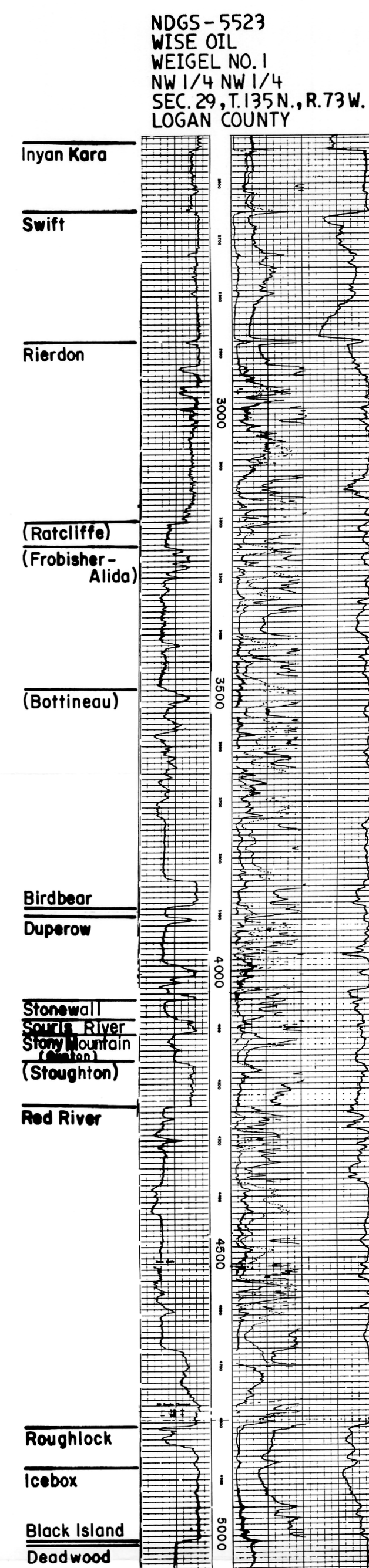
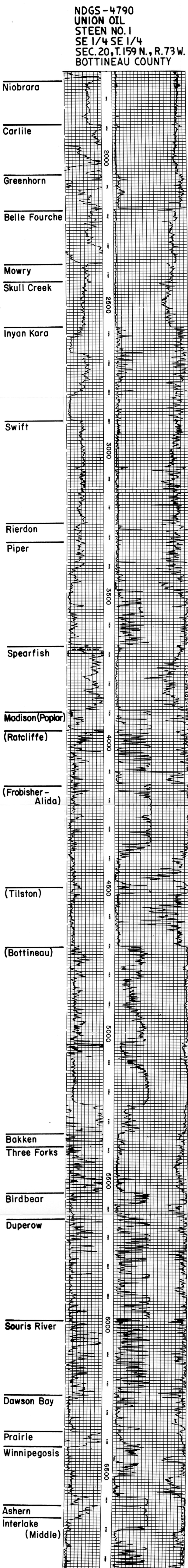
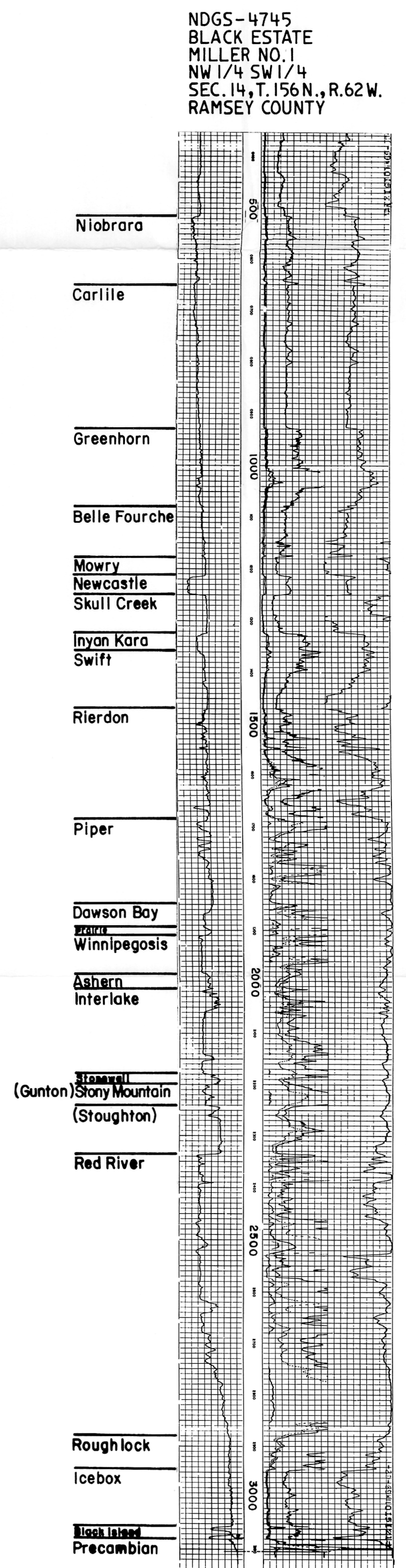
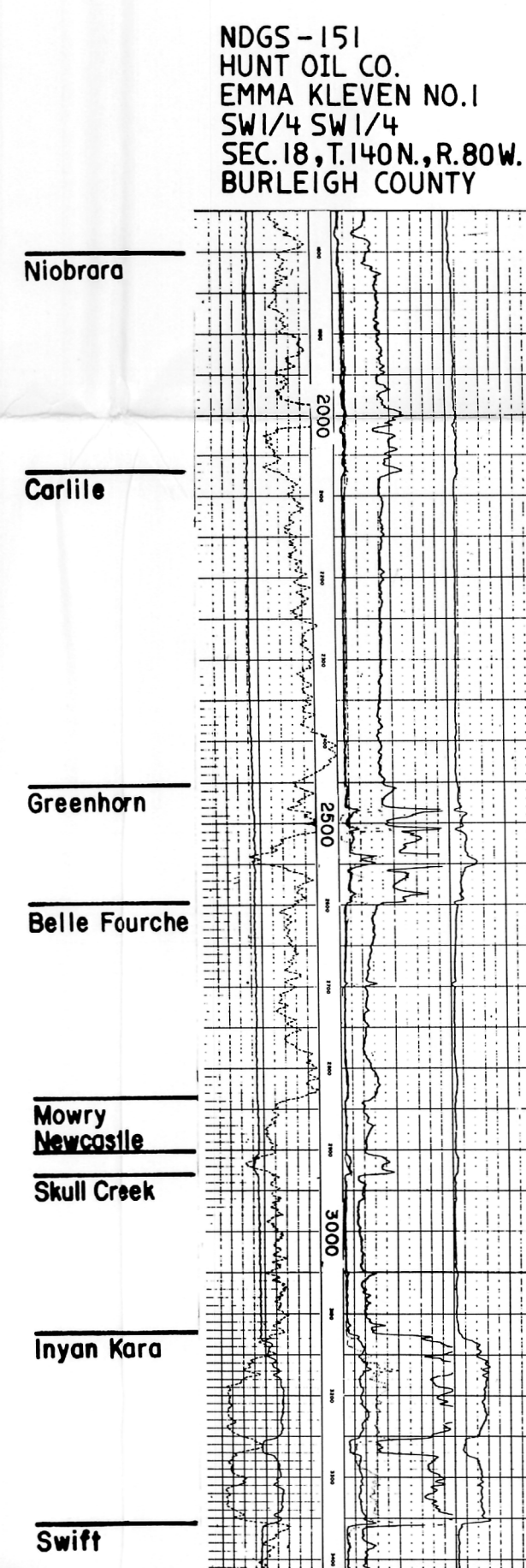
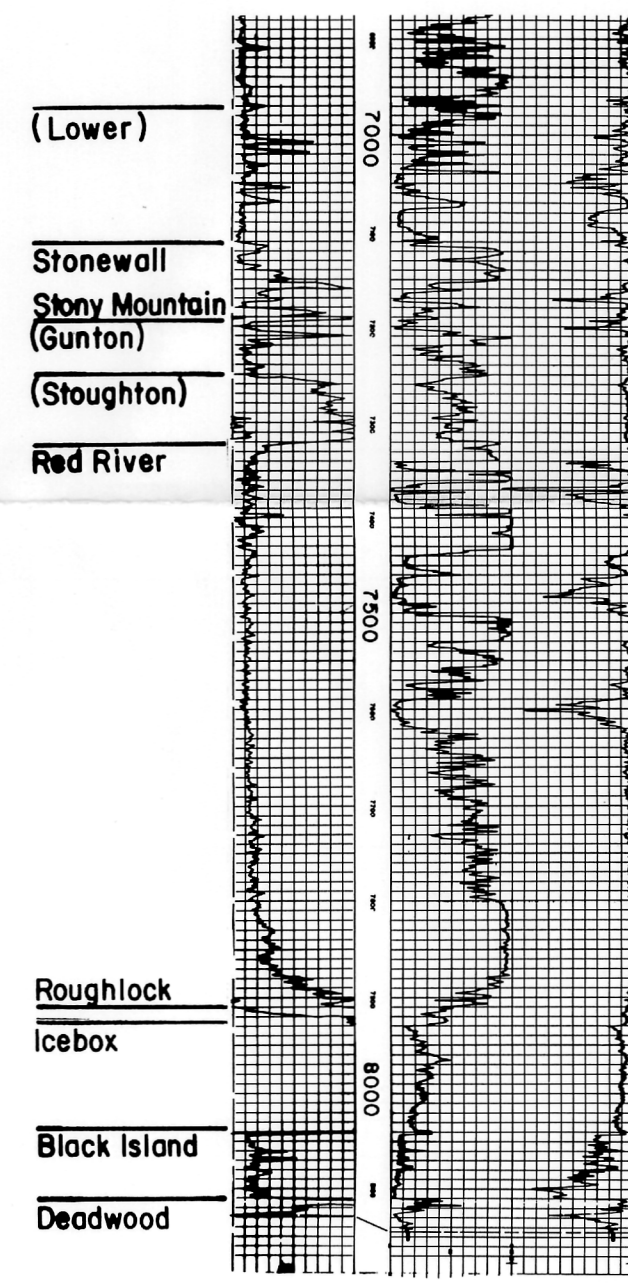
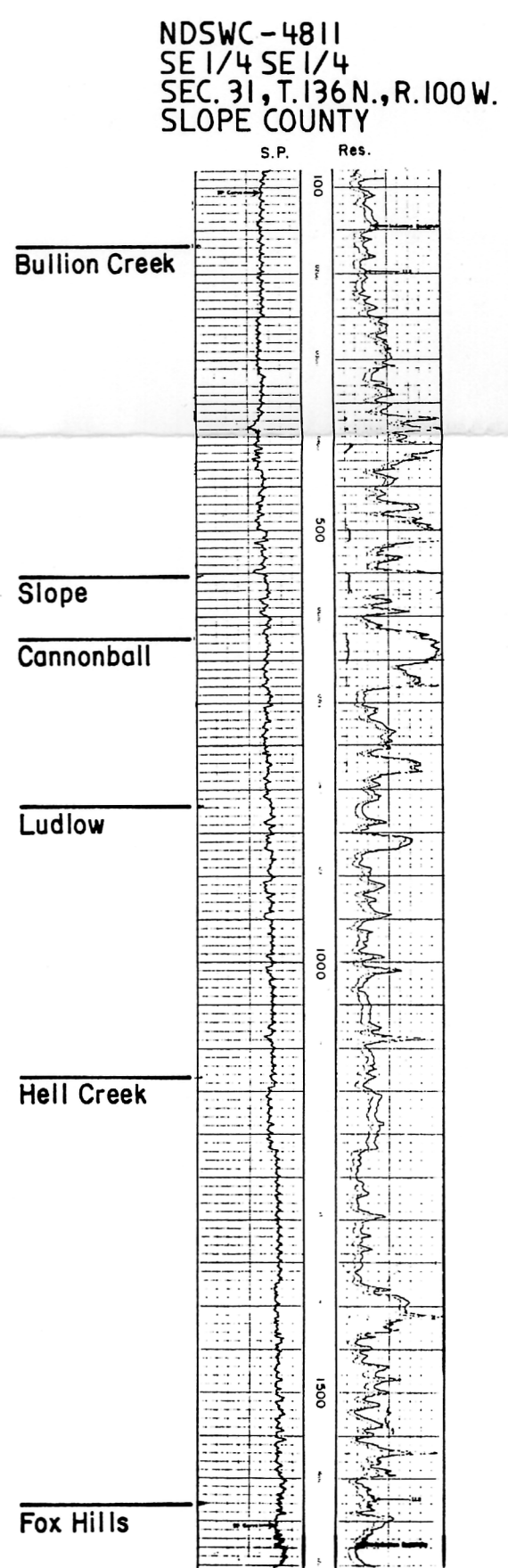


NDGS-6228
 GULF OIL
 ZABOLOTNY NO. 1-3-4A
 NW 1/4 SE 1/4
 SEC. 3, T. 144N., R. 98W.
 BILLINGS COUNTY



NDGS-10571
 STRIKER PETROLEUM
 RUPERT NO. 1
 SW 1/4 SW 1/4
 SEC. 26, T. 130N., R. 102W.
 BOWMAN COUNTY





**REPRESENTATIVE GEOPHYSICAL LOGS
 EXPLANATION**

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