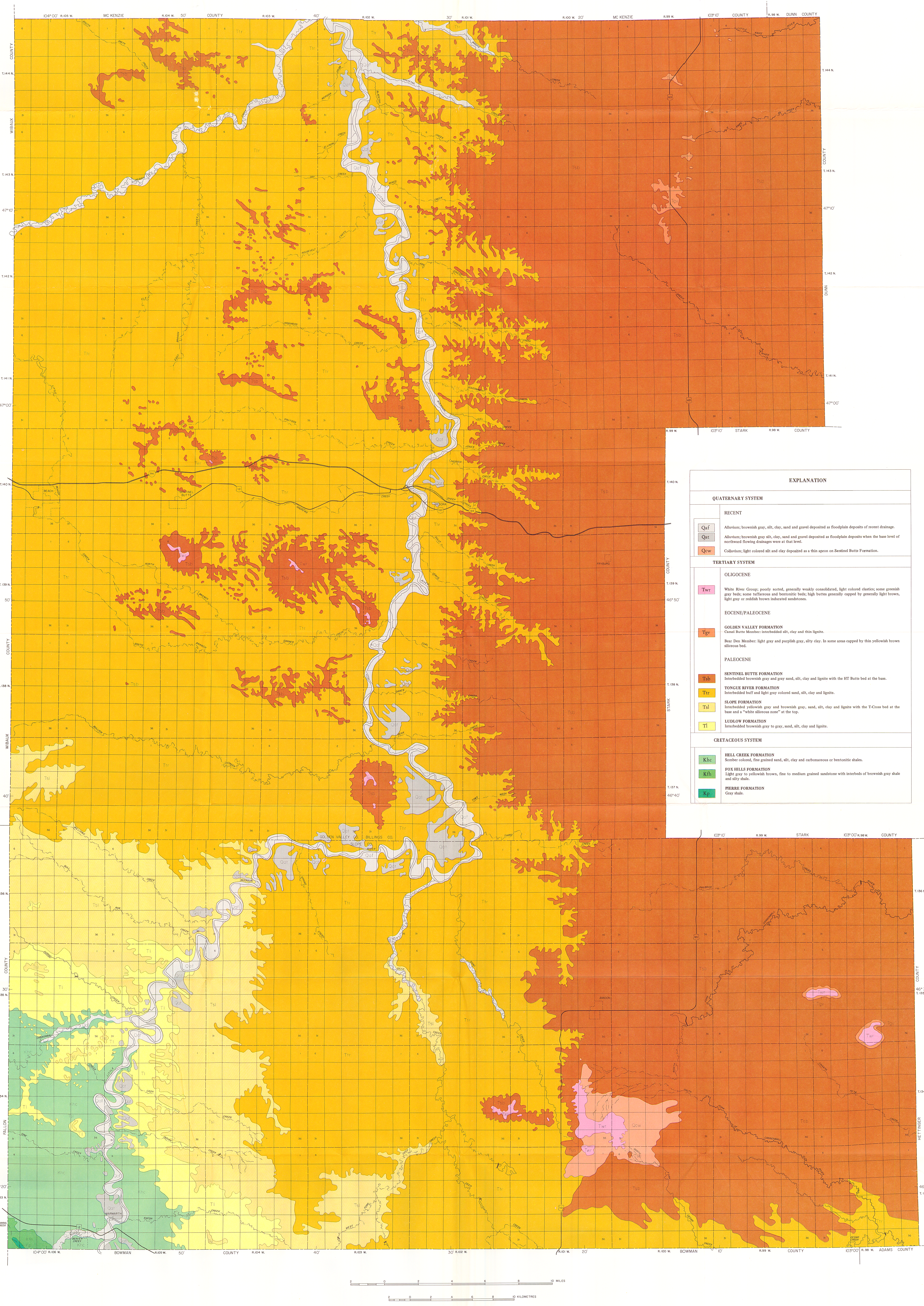
PART I PLATE I
COUNTY GROUNDWATER STUDIES 29
BULLETIN NO. 76

PLATE 1. GEOLOGY OF BILLINGS, GOLDEN VALLEY AND SLOPE COUNTIES.

by
C. G. Carlson

NORTH DAKOTA GEOLOGICAL SURVEY
Don L. Halvorson, State Geologist



EXPLANATION

QUATERNARY SYSTEM

RECENT

- **Qaf** — Alluvium; brownish gray, silt, clay, sand and gravel deposited as floodplain deposits of recent drainage.
- **Qat** — Alluvium; brownish gray silt, clay, sand and gravel deposited as floodplain deposits when the base level of northward flowing drainages were at that level.
- **Qcw** — Colluvium; light colored silt and clay deposited as a thin apron on Sentinel Butte Formation.

TERTIARY SYSTEM

OLIGOCENE

- **Twr** — White River Group; poorly sorted, generally weakly consolidated, light colored clastics; some greenish gray beds; some tuffaceous and bentonitic beds; high buttes generally capped by generally light brown, light gray or reddish brown indurated sandstones.

EOCENE/PALEOCENE

- **Tgv** — **GOLDEN VALLEY FORMATION**
  Camel Butte Member: interbedded silt, clay and thin lignite.
  Bear Den Member: light gray and purplish gray, silty clay. In some areas capped by thin yellowish brown siliceous bed.

PALEOCENE

- **Tsb** — **SENTINEL BUTTE FORMATION**
  Interbedded brownish gray and gray sand, silt, clay and lignite with the HT Butte bed at the base.
- **Ttr** — **TONGUE RIVER FORMATION**
  Interbedded buff and light gray colored sand, silt, clay and lignite.
- **Tsl** — **SLOPE FORMATION**
  Interbedded yellowish gray and brownish gray, sand, silt, clay and lignite with the T-Cross bed at the base and a "white siliceous zone" at the top.
- **Tl** — **LUDLOW FORMATION**
  Interbedded brownish gray to gray, sand, silt, clay and lignite.

CRETACEOUS SYSTEM

- **Khc** — **HELL CREEK FORMATION**
  Somber colored, fine grained sand, silt, clay and carbonaceous or bentonitic shales.
- **Kfh** — **FOX HILLS FORMATION**
  Light gray to yellowish brown, fine to medium grained sandstone with interbeds of brownish gray shale and silty shale.
- **Kp** — **PIERRE FORMATION**
  Gray shale.

PLATE 2. GEOLOGIC CROSS SECTION OF LOWER CRETACEOUS STRATA OF BILLINGS, GOLDEN VALLEY AND SLOPE COUNTIES.

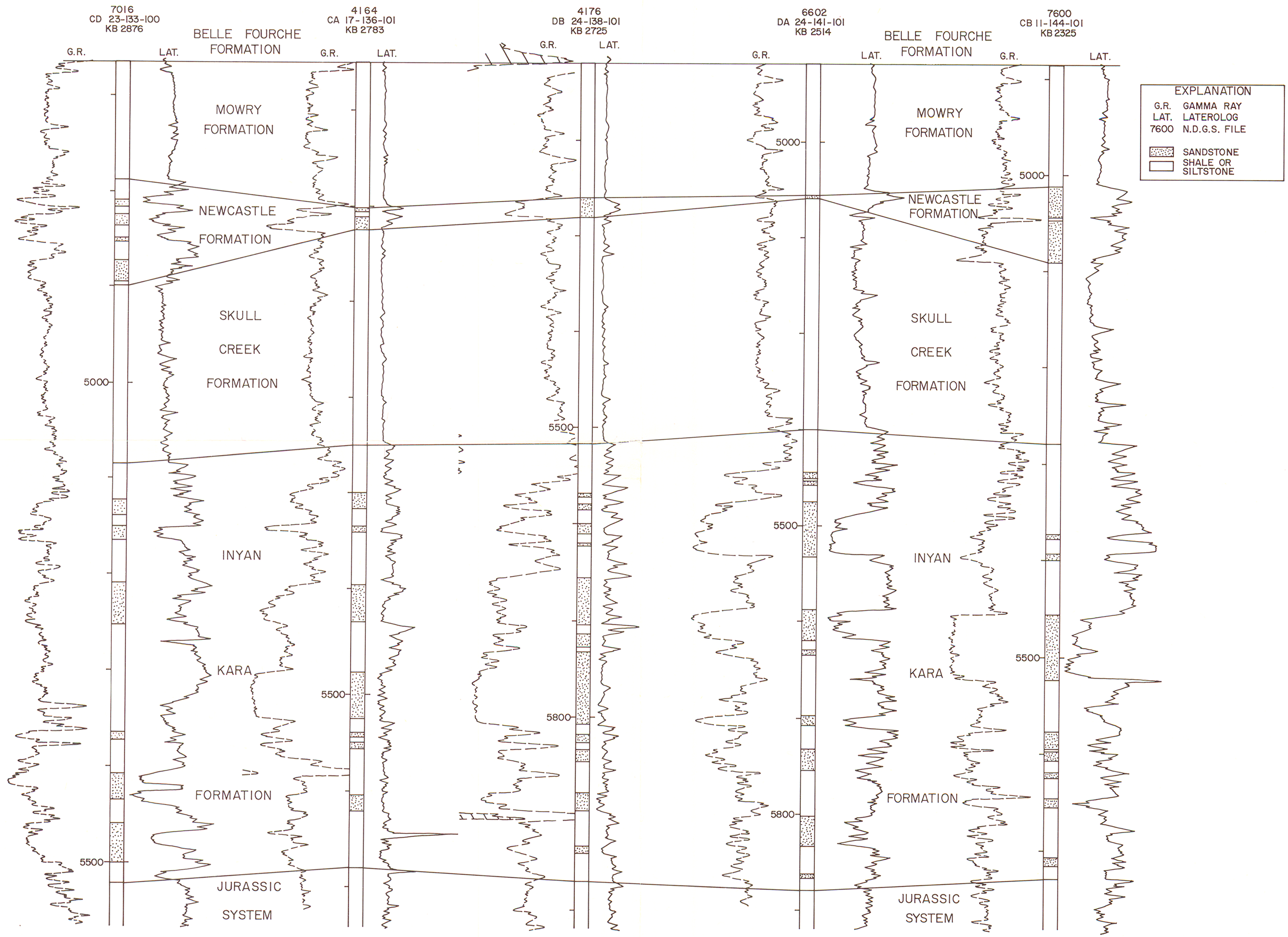


PLATE 3. GEOLOGIC CROSS SECTION OF TERTIARY AND UPPER CRETACEOUS STRATA ACROSS SOUTHERN SLOPE COUNTY.

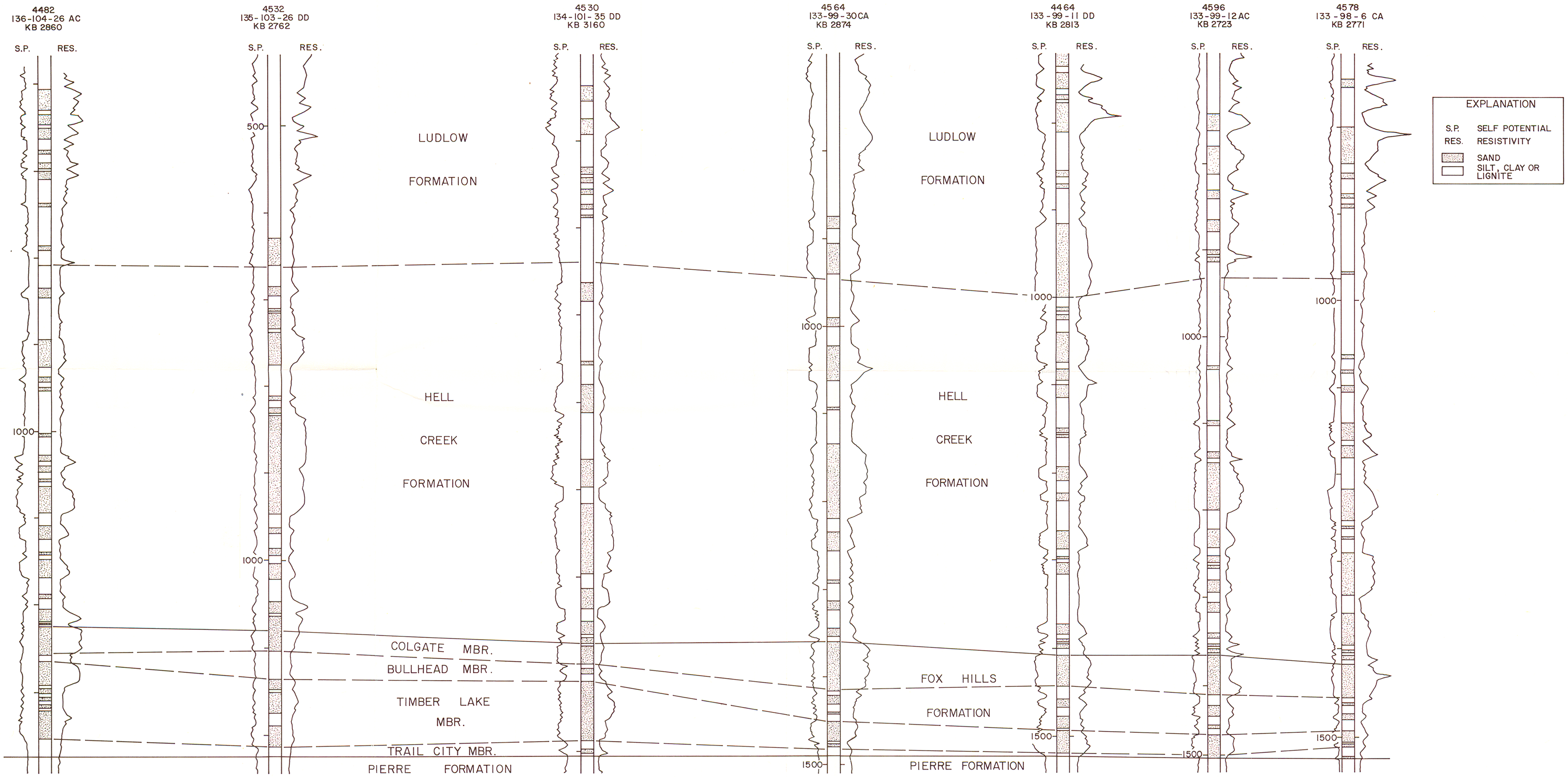


PLATE 4. GEOLOGIC CROSS SECTION OF TERTIARY AND UPPER CRETACEOUS STRATA OF BILLINGS, GOLDEN VALLEY AND SLOPE COUNTIES.

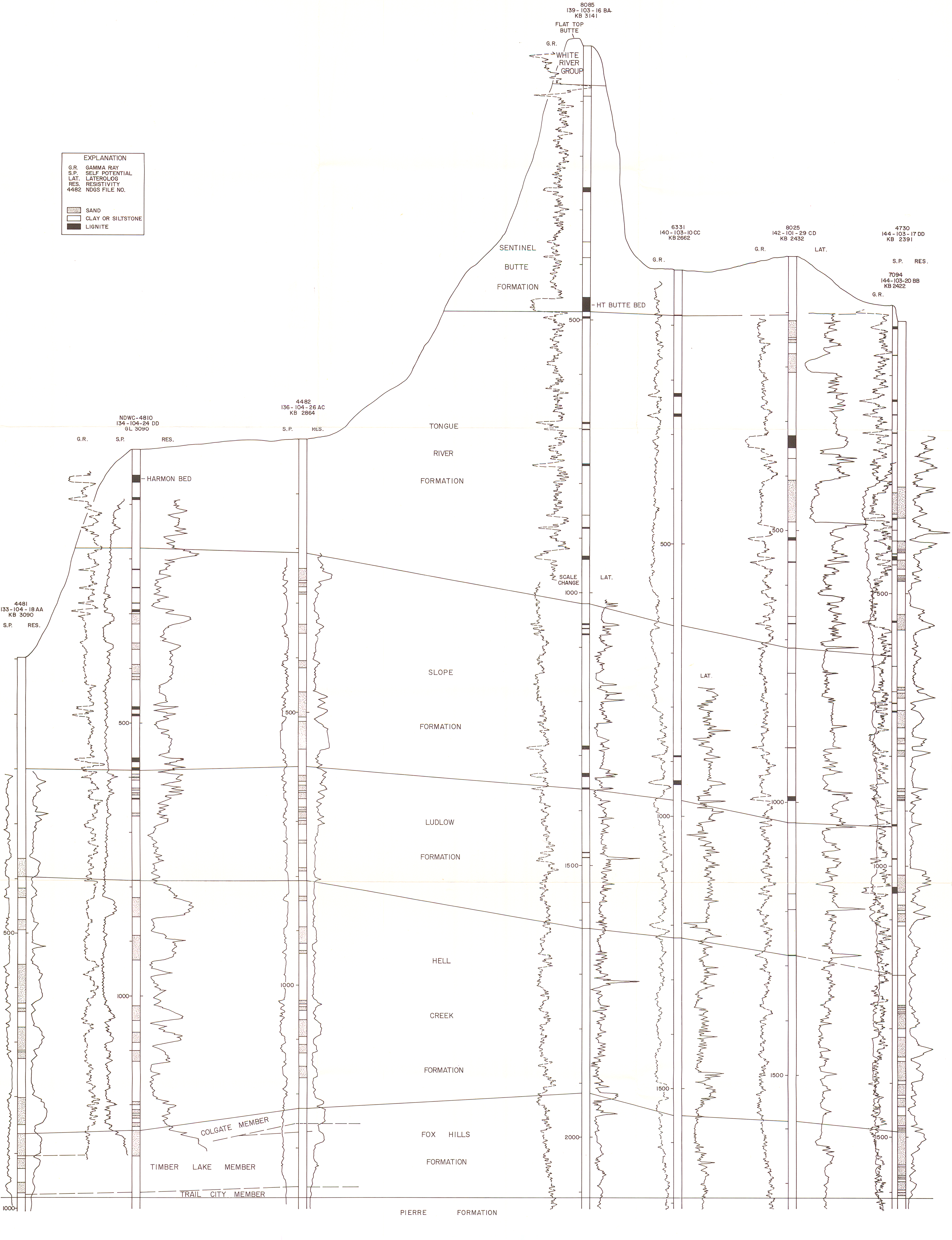


PLATE 5. GEOLOGIC CROSS SECTIONS OF TERTIARY STRATA IN BILLINGS, GOLDEN VALLEY AND SLOPE COUNTIES.