EXPLANATION

Recent

Qc — Colluvium
Heterogeneous mixture of till, fragments of Fort Union formation, and of sand, gravel, and boulders; confined principally to the bases of steep escarpments

Qal — Alluvium
Postglacial parallel-bedded fluvial deposits of silt, sand, and gravel mantling most of the large valley floors, and within many of the larger kettles

Qd — Dune sand
Large irregular areas of unconsolidated eolian sand derived principally from channel outwash

Qst — Stream terrace deposits
Localized postglacial deposits of sand and gravel flanking minor tributaries

Pleistocene

Wisconsin stage — Mankato substage

Qtm — Till of Mankato age
Unsorted, moderately consolidated mixture of clay, sand, gravel, and boulders. Blue gray where fresh, light brown where oxidized. Surface marked by many kettles

Qcm — Channel outwash deposits
Glacio fluvial sand and gravel, predominantly of Canadian Shield origin, filling former channels

Qic — Ice-contact deposits
Irregular patches of poorly sorted sand and gravel formed during melting of last ice sheet

Qek — Eaker deposits
Sinuous, narrow ridges of crossbedded sand and gravel locally veneered with either till or boulders

Qcv — Crevasse deposits
Linear, narrow ridges of unsorted sand and gravel mantled with either till or boulders

Qkm — Kame deposits
Conical hills of well-bedded sand and gravel locally mantled with either till or boulders

Qktm — Kame-terrace deposits
Stratified drift enclosing large erratics and till blocks, formed marginal to lobes or blocks of last ice sheet

Wisconsin stage

Qtmm — Till of middle(?) Wisconsin age
Unsorted, moderately consolidated mixture of clay, sand, gravel, and boulders. Blue gray where fresh, light brown where oxidized. Surface marked by integrated drainage system

Qimm — Ice-contact deposits
Irregular patches of poorly sorted sand and gravel

Early(?) Wisconsin to Mankato substage

Qkt — Outwash terrace deposits
Terraces of stratified drift flanking channels; formed by dissection of former continuous body of outwash

Qtw — Till of early(?) Wisconsin age
Unsorted, moderately consolidated mixture of clay, sand, and gravel, and boulders. Blue gray where fresh, light brown where oxidized. Surface marked by integrated drainage system. Differs lithologically from till of middle(?) Wisconsin age

Qcw — Channel outwash deposits
Glacio fluvial sand and gravel, predominantly of Canadian Shield origin, filling former channels

Qal — Alluvial silt
Buff-colored even-bedded silt deposits in heads of small valleys tributary to valley of Missouri River

Qek — Eaker deposits
Sinuous, narrow ridges of crossbedded sand and gravel locally veneered with either till or boulders

Qcv — Crevasse deposits
Linear, narrow ridges of unsorted sand and gravel locally mantled with either till or boulders

Qk — Kame deposits
Conical hills of well-bedded sand and gravel locally mantled with either till or boulders

Qkt — Kame-terrace deposits
Stratified drift enclosing large erratics and till blocks, formed marginal to lobes or blocks of last ice sheet

QUATERNARY

Qpt — Terrace deposits below till
Terrace deposits of stratified sand and gravel, formed prior to deposition of early(?) Wisconsin till, locally exhumed from beneath till

Qg — Gravel
Superficially similar to Flaxville gravel in color, lithology, and mode of occurrence. However, composed of local material and rocks derived from Canadian Shield. Of early(?) Quaternary age and possibly older

Miocene or Pliocene

Tfg — Flaxville gravel
Well-rounded nonglacial fluvial sand and gravel. Three rock types predominate: quartzite (about 66 percent), quartz (about 20 percent), and chert (about 14 percent)

Paleocene

Tfu — Fort Union formation
Yellow to buff layers of claystone, siltstone, and sandstone, alternating with carbonaceous seams and lignite beds. Limy concretions scattered irregularly throughout the formation

TERTIARY

Contact — *Long dashes where approximate; short dashes where indefinite. Queried where doubtful*

Drift border — *Approximate boundary between Mankato, middle(?) Wisconsin, and early(?) Wisconsin drift sheets. Queried where location in question*

Approximate southern limit of Max moraine; exact location in question

Till ridges — *Linear* — *Arcuate*

Till covered knob

Till-buried channel — *Continuous easily discernable topographic swale lined with till*

Lignite mine shafts — *Active* — *Inactive*

Lignite strip mines — *Active* — *Inactive*

Gravel pit

Drill hole

Benchmarks — *Permanent* — *Temporary*

Saline lake

Water level — *In feet*

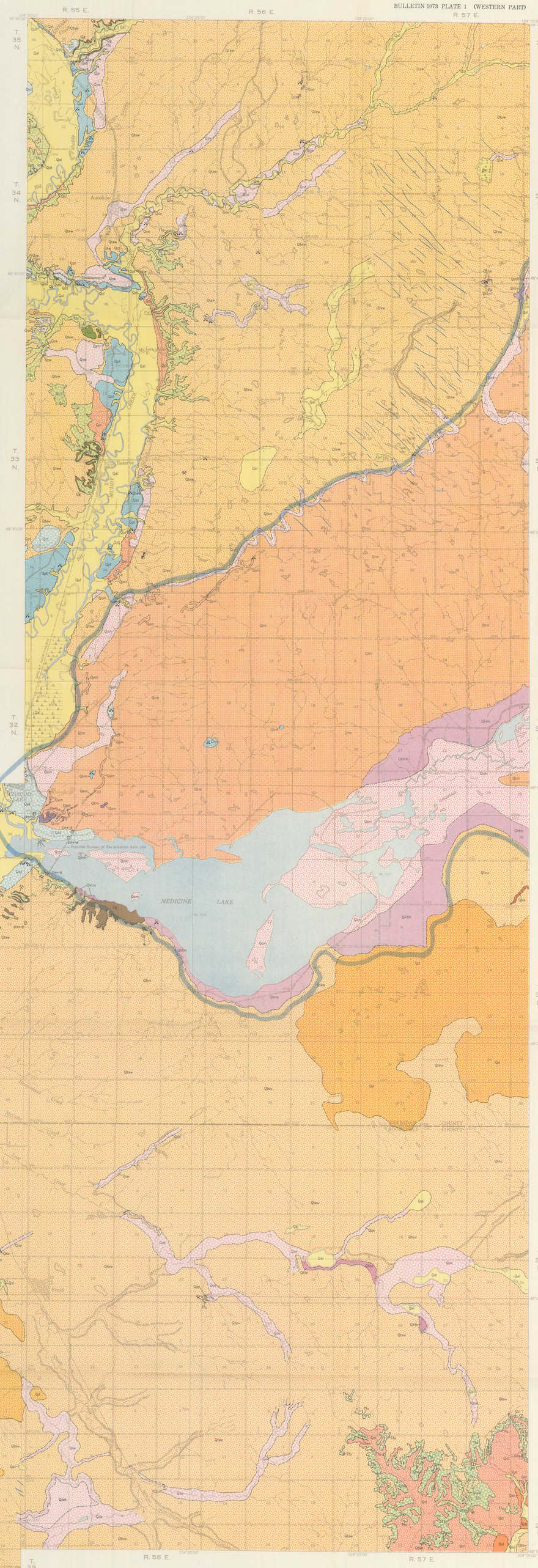
GEOLOGIC MAP
OF THE
SMOKE CREEK-MEDICINE LAKE-GRENORA AREA
MONTANA AND NORTH DAKOTA

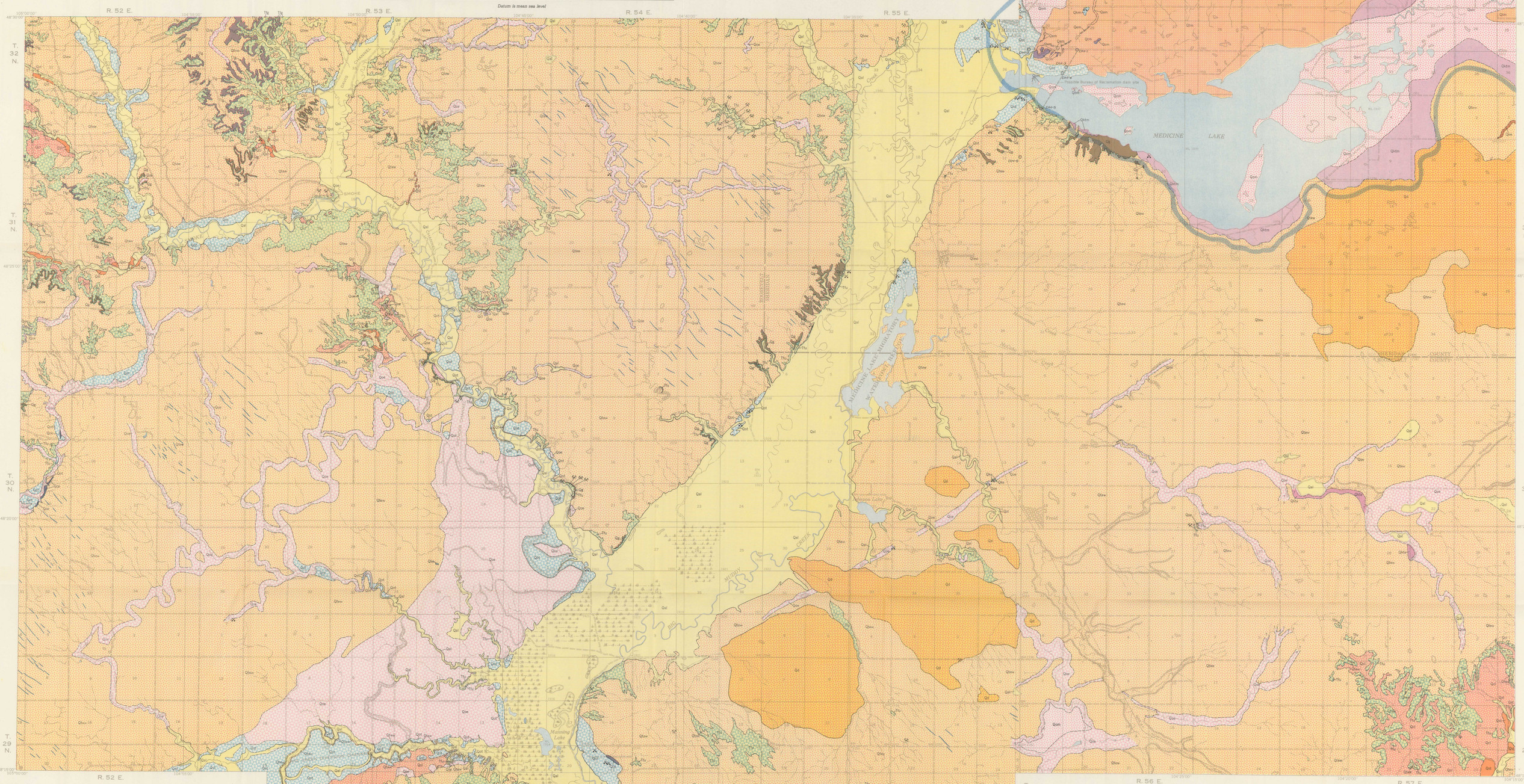
By G. B. Gott, I. J. Witkind, W. R. Hansen, R. M. Lindvall, C. E. Prouty, J. H. Smith, R. E. Basile, and C. A. Kaye, assisted by R. H. T. Dodson, R. W. Osterstock, and S. Meltzer. Mapped in 1946, 1947, and 1948

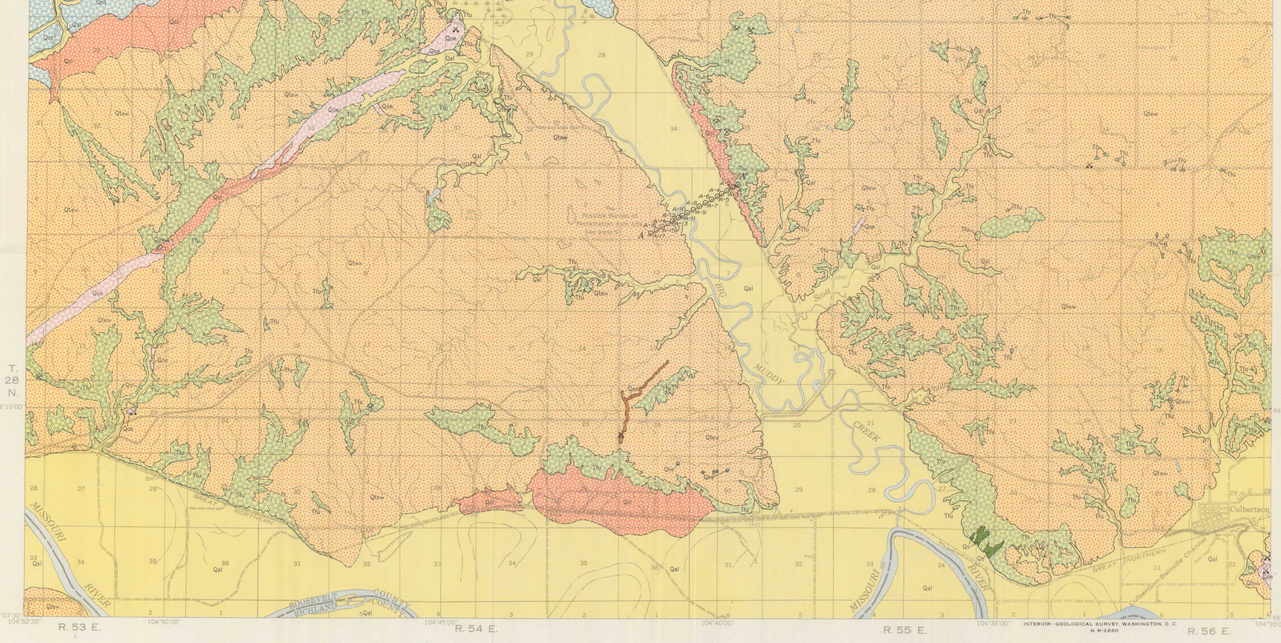
Scale 1:62,500

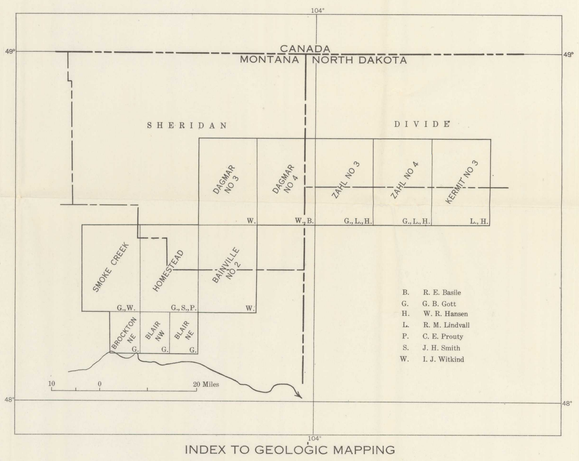
1 — 0 — 6 Miles

Datum is mean sea level









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