U. S. GEOLOGICAL SURVEY
CHARLES D. WALCOTT, DIRECTOR

STRUCTURE AND ECONOMIC GEOLOGY

PENNSYLVANIA
KITTANNING QUADRANGLE

LEGEND

SEDIMENTARY ROCKS

(Areas of subaqueous deposits are shown by patterns of parallel lines; subaerial deposits by patterns of dots and circles)

QUATERNARY

Recent

- **Qal** — Alluvium *(in flood plains of present streams)*

Pleistocene

- **Qg** — Glacial gravel *(outwash gravels and sands of probable Kansan age; contain pebbles of Medina sandstone and crystalline rock.)*
- **Qcm** — Carmichaels formation *(sand, silt, clay, and water-worn particles of underlying rocks)*
- **Qoa** — Older alluvium *(gravel and silt of local derivation)*

CARBONIFEROUS

Pennsylvanian

- **Ccm** (Cam, Ccb) — Conemaugh formation with Ames limestone and Saltsburg sandstone lentils *(sandy shale and coarse sandstones, with thin coal seams and impure limestones)*
- **Ca** (Cv) — Allegheny formation and Vanport limestone lentil *(shale and massive sandstones with beds of limestone and several valuable beds of coal and fire clay)*
- **Cpv** — Pottsville formation *(massive sandstone, often shaly at the top and at horizon of Mercer coals)*

Mississippian

- **Cpo** — Pocono formation *(massive sandstone, with small coal seams and associated shale)*

Known productive areas

Coal outcrops *(continuous lines represent coal beds of workable or probably workable thickness; dashed lines, coal beds not known to be workable)*

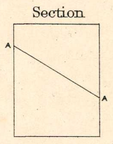
Upper Freeport, uf
Lower Freeport, lf
Upper Kittanning, uk
Middle Kittanning, mk
Lower Kittanning, lk
Clarion, cl
Craigsville, cg

Contour lines drawn on the upper surface of the Vanport limestone lentil in the Allegheny formation *(contour interval is 50 feet; datum is mean sea level)*

Oil pools *(projected to the surface; individual wells not shown)*

Mines and quarries — *Coal mines, unless otherwise marked*
Scattered oil wells
Gas wells
Sections of numbered wells are shown on well-section sheet.

Section



H. M. Wilson, Geographer in charge.
Control by S. S. Gannett and E. L. Mc Nair.
Topography by W. L. Miller and W. Carvel Hall.

SURVEYED IN 1900, IN COOPERATION WITH THE STATE OF PENNSYLVANIA.

TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION 1902.

Scale $\frac{1}{62500}$

1 ½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

Contour interval 20 feet.
Datum is mean sea level.
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Geology by Charles Butts, L. H. Woolsey, and Frank Leverett, under the direction of Marius R. Campbell.

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