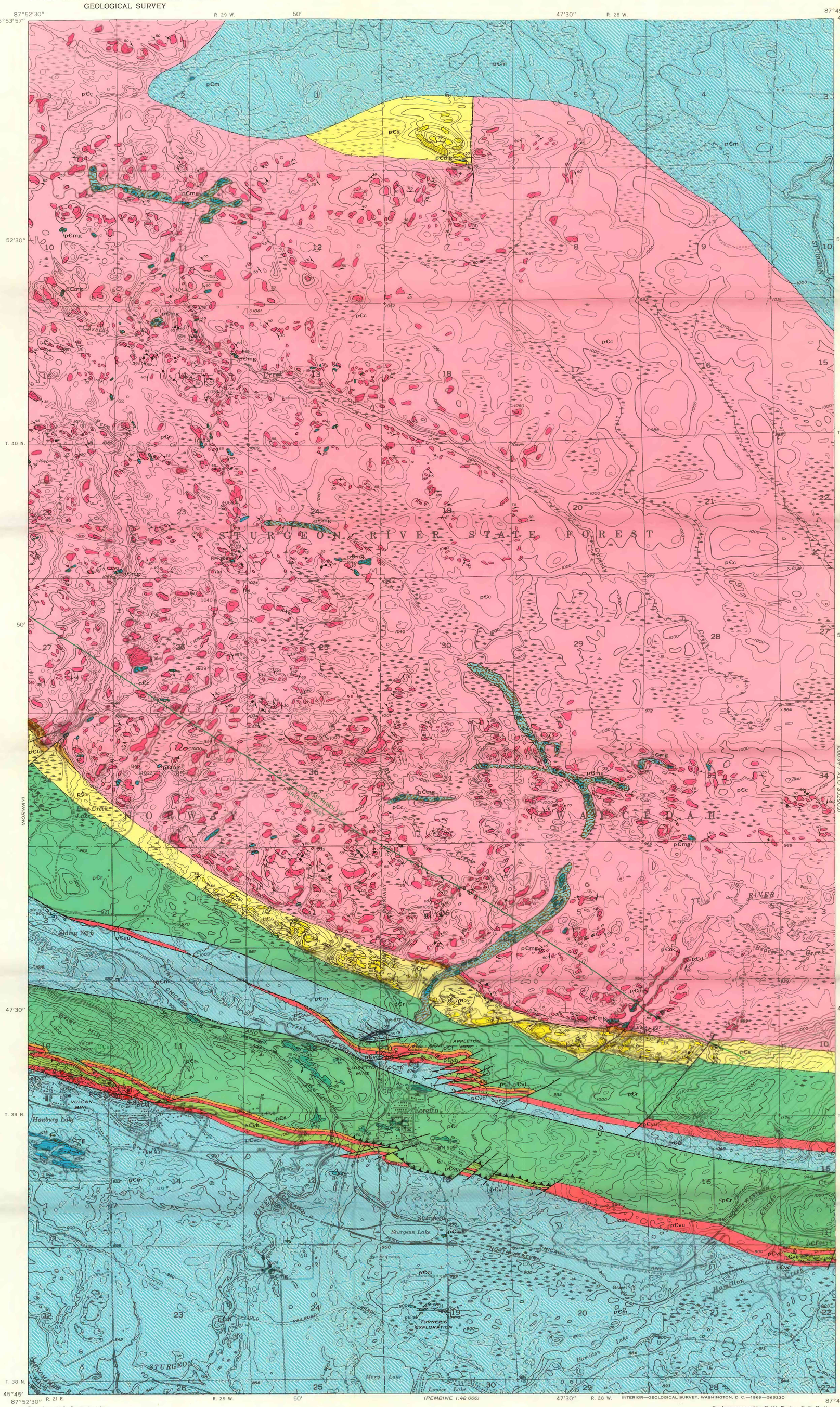
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PROFESSIONAL PAPER 513
PLATE 3



EXPLANATION

Outcrop areas shown by darker shade

Upper Precambrian — Keweenawan Series

- Sandstone and dolomite — OCsd
- Fresh olivine diabase in scattered thin dikes — pCd

Middle Precambrian — Animikie Series

Baraga Group

- Hoskin Lake Granite — pCh
- Marinette Quartz Diorite — pCma
- Metagabbro dikes and sills and related intrusive rocks — pCmg, *magnetic metagabbro*
- Badwater Greenstone — pCb
  Chiefly altered basaltic lava flows (greenstone)
- Michigamme Slate — pCm
  Sericitic, chloritic, and graphitic slate, dolomite, quartzite, and graywacke, and minor iron-formation

UNCONFORMITY

Menominee Group

- Vulcan Iron-Formation undivided — pCvu
  Includes four members
- Loretto Slate Member — pCvl
  Ferruginous siliceous slate
- Curry Iron-Bearing Member — pCvc
  Chert-hematite-magnetite iron-formation. Granular and oolitic jasper common in chert layers. Very magnetic at most places
- Brier Slate Member — pCvb
  Thinly laminated ferruginous slate and siltstone. Commonly contains abundant magnetite or martite
- Traders Iron-Bearing Member — pCvt
  Thin-bedded siliceous iron-formation like Curry Member, but at most places less magnetic than Curry Member
- Felch Formation — pCf
  Quartzose sericitic slate, quartzite, and conglomerate. Ferruginous quartzite ("Traders quartzite") near top of formation along south iron range

UNCONFORMITY

Chocolay Group

- Randville Dolomite — pCr
  Thick-bedded crystalline dolomite, thin-bedded sandy dolomite, algal dolomite, dolomitic slate, conglomerate, and breccia
- Sturgeon Quartzite — pCs
  Thick- and thin-bedded vitreous quartzite. Sericitic schist and quartzite in basal part
- Fern Creek Formation — pCfc
  Arkose, arkosic and argillaceous conglomerate, argillite, slate, and possibly tillite

UNCONFORMITY

Lower Precambrian

- Carney Lake Gneiss — pCc
  Granitic gneiss and granite
- Quinnesec Formation — rhy / pCq
  Altered volcanic rocks, chiefly basaltic flows and pyroclastics; some metarhyolite and other silicic types in north part; minor intercalations of metasedimentary rocks
  rhy; *metarhyolite and closely related rocks and sericitic schists derived from them*

CAMBRIAN AND ORDOVICIAN

PRECAMBRIAN

- Anticline — *Showing trace of axial plane and bearing and plunge of axis*
- Overturned anticline — *Arrows indicate dip direction of limbs*
- Syncline — *Showing trace of axial plane and bearing and plunge of axis*
- Overturned syncline — *Arrows indicate dip direction of limbs*
- Bearing and plunge of axis of small fold
- Plunge of closely spaced minor folds
- *Inclined*
- *Vertical*
- *Overturned*
  Strike and dip of beds
- *Lava pillows*
- *Crossbedding*
- *Ripple marks*
- *Algal structures*
  Features showing top direction of beds
- Bearing and plunge of lineation
- *Inclined*
- *Vertical*
  Strike and dip of foliation
- Strike of vertical foliation and plunge of lineation
- Preferred strike of feldspar phenocrysts in granite
- *Inclined*
- *Vertical*
  Strike and dip of joints
- Approximate structure contours on Randville Dolomite — *Datum is mean sea level*
- Test shafts and shafts to underground iron mines. All inactive
- Adit
- Test trench
- Test pit
- Caved ground
- Diamond-drill hole — *Number indicates elevation at top of Randville Dolomite*
- Diamond-drill holes on cross sections
- GREEN SCHIST / OLIGOCLASE-AMPHIBOLITE
  Isofacies of regional metamorphism

Outcrop or outcrop area

Contact — *Dashed where approximate or inferred; queried where doubtful*

Fault, showing dip — *Dashed where approximately located; queried where doubtful.* U, *upthrown side;* D, *downthrown side*

Thrust fault — *Sawteeth on upper plate*

Fault zone

Brecciated rock

ROCK OUTCROPS MAPPED WITHIN GEOLOGIC UNITS

amph,	amphibolite
bca,	breccia or brecciated rock
blk,	black
cgl,	conglomerate
ch,	chert or cherty rock
dac,	dacite
dolo,	dolomite or dolomitic rock
ell,	ellipsoidal greenstone
fe,	ferruginous rock
gn,	gneiss
gph,	granophyre
graph,	graphite
gs,	greenstone
gw,	graywacke
gy,	gray
if,	iron-formation
porph,	porphyry
qtz,	quartz or quartzite
rhy,	rhyolite
sch,	schist or schistose rock
sil,	siliceous rock
sl,	slate

Base from U.S. Geological Survey topographic quadrangles

Geology mapped by R. W. Bayley, C. E. Dutton, C. A. Lamey, S. B. Treves, and J. Trow, 1946–57.
Geology, compiled by R. W. Bayley, 1957

GEOLOGIC MAP, LORETTO AREA, DICKINSON COUNTY, MICHIGAN

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