

HEAVY METAL CONTENT OF STREAM SEDIMENTS IN THE PHILLIPS QUADRANGLE

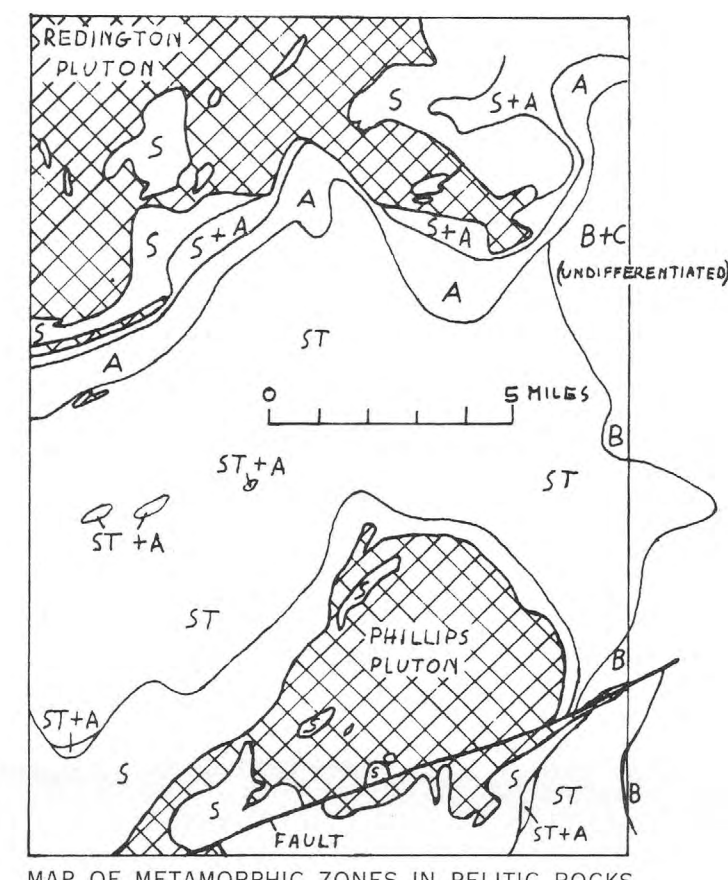
EXPLANATION

C D
A B

Location of active-stream sediment sample showing metal content, in parts per million (ppm): (A) cold acid-soluble copper, not shown where < 1 ppm; (B) total copper, not shown where < 10 ppm; (C) readily-extractable heavy metals (principally copper, lead, and zinc) expressed as ppm zinc equivalent; (D) total zinc. Lead in all samples < 25 ppm.

All samples analyzed by semiquantitative field methods using procedures described by F. H. Ward, H. W. Lakin, and F. O. Canney (1966). Analytical methods used in geochemical exploration by the U.S. Geological Survey: U.S. Geol. Survey Bull. 1152.

The minus 50 mesh fraction of the sample was used for analysis. The cold acid-soluble copper method uses hydrogen peroxide to measure the amount of copper dissolved from the sample by an ambient temperature solution of 6 M hydrochloric acid. The readily-extractable heavy metal procedure uses diethylenetriamine to measure the quantity of heavy metals extracted by an ambient-temperature solution of ammonium citrate at a pH of 6.5. Total copper, lead, and zinc were determined by colorimetric procedures using hydrogen peroxide (copper) and diethylenetriamine (lead and zinc) after decomposition of the sample by fusion with potassium bisulfate. Analysts: G. H. Van Sickle, G. A. Rowland, and K. W. Leong, of the U.S. Geological Survey.



MAP OF METAMORPHIC ZONES IN PELTIC ROCKS

EXPLANATION

Quartz monzonite and granodiorite

S

Sillimanite-bearing hornfels

ST+A

Sillimanite- and andalusite-bearing hornfels and schist

A

Andalusite-bearing schist and phyllite

ST+A

Staurolite- and andalusite-bearing schist

ST

Staurolite-bearing schist and phyllite

B

Biotite-bearing phyllite

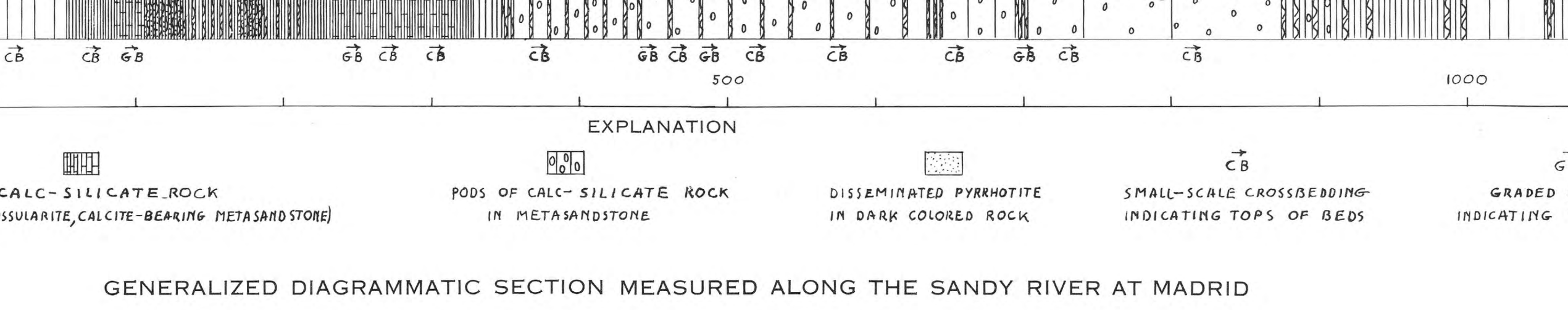
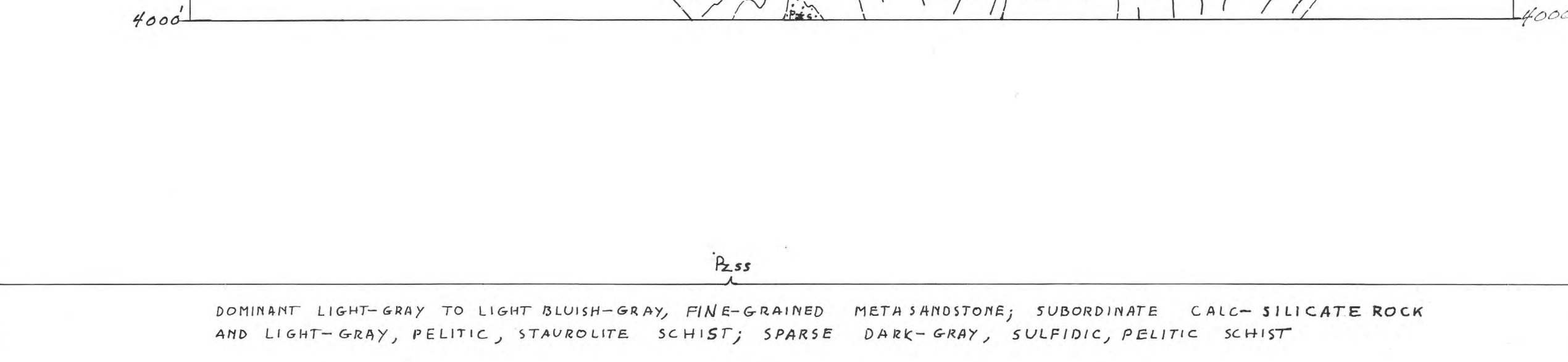
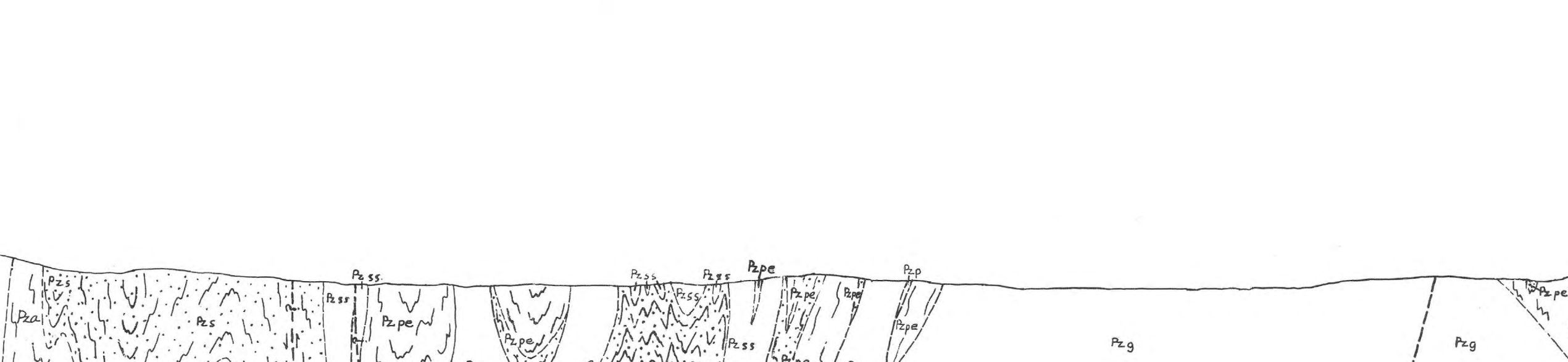
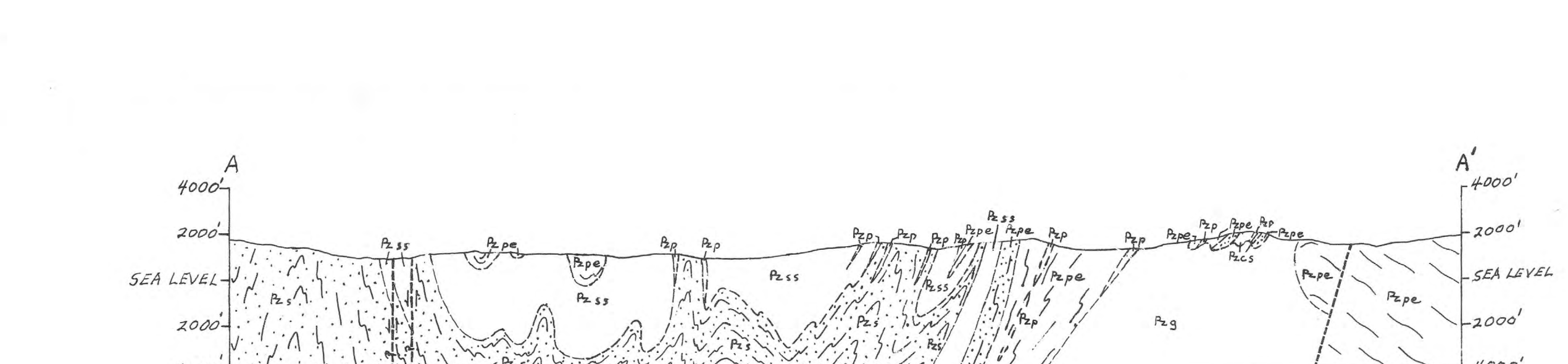
C

Chlorite-bearing slate and phyllite



Base map by Topographic Division, U.S. Geological Survey. Geology by Robert H. Moench, 1950-52, and 1961, assisted by James A. Rodgers.

SCALE 1:62,500
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL
QUADRANGLE LOCATION



GENERALIZED DIAGRAMMATIC SECTION MEASURED ALONG THE SANDY RIVER AT MADRID

EXPLANATION

IGNEOUS AND METASOMATIC ROCKS

Langmuir dike
Dashed where inferred

Trap dike
Dashed where inferred

Porphyry dike
Dashed where inferred

Pegmatite
Pegmatite, granite, and aplite rocks composed of quartz, microcline, sodic plagioclase, subordinate muscovite, black tourmaline, and sparse almandine; large masses are gneissic; unit possibly metamorphic in part

Quartz monzonite and granodiorite
Bodies: fine-grained, equigranular, biotite-muscovite monzonite, and subordinate quartz diorite near margins of main body

Redington pluton and satellite bodies: fine- to coarse-grained, equigranular to porphyritic biotite-muscovite granodiorite, quartz monzonite, and subordinate quartz diorite; containing porphyritic variety, containing microcline phenocrysts as much as 2 inches long, is exposed mainly at higher elevations near inferred roof of pluton

METASEDIMENTARY ROCKS

Pelitic rocks and associated metasediments, calc-silicate rock, and dolomite limestone

Pelitic rocks, dominantly gray, locally rusty weathering pelitic phyllite, schist, and hornfels; commonly occurs in very thick, homogeneous beds; also forms thin to thick beds cyclically interstratified with subordinate laminations and thin to thick beds of fine- to medium-grained metasediments; ratio of pelitic rocks to metasediments generally greater than 2:1; graded bedding and small-scale trough cross laminations common; thin beds, boudins, and elongate pods of calc-silicate rock locally abundant in pelitic rock. Stippled where sulfide minerals abundantly disseminated; pyrrhotite is dominant sulfide mineral; pyrite is locally abundant

Metasediments: light-gray to bluish gray, thinly laminated to thick-bedded; dominantly fine-grained, locally coarse-grained, containing quartz granules; commonly exhibit small-scale trough cross laminations; form many lenses too small to show in southeast corner of quadrangle

Metasediments: very finely bedded, mottled and banded white, green and gray rock composed of carbonate minerals, epidote-clinoclase, tremolite-actinolite, diopside, and other minerals

Metasediments: light-gray to bluish-gray, fine-grained metasediments and subordinate thick to very thin beds of pelitic rock and calc-silicate rock; metasediments forms units of similar lithology that range from a few inches to 40 feet in thickness; rock is massive to distinctly laminated; small- to medium-scale trough cross laminations common; graded bedding common between metasediments and pelitic beds; thicker beds of metasediments characteristically contain elliptical pods of calc-silicate rock as much as 1 1/2 feet thick and elongate parallel to foliation; some pelitic zones in unit contain sparse sulfide minerals

Sulfide-bearing pelitic phyllite and schist, metasediments and calc-silicate rock

Sulfide-bearing dark-gray to black, thinly to very finely bedded pelitic phyllite and schist, metasediments, and calc-silicate rock; thick beds of coarse-grained metasediments common near base; central part dominantly thinly to very finely bedded pelitic rock; upper part dominantly thinly to very finely bedded, fine-grained metasediments and calc-silicate rock; graded bedding and small-scale trough cross lamination common. Pyrrhotite abundantly disseminated throughout unit; pyrite locally abundant

Arkose metasediments

Dominantly light-gray or yellowish-gray, fine- to coarse-grained, arkose metasediments cyclically interstratified with subordinate silty-gray pelitic schist and hornfels; ratio of metasediments to pelitic rock about 1:1, variable; metasediments beds thin to very thick, characteristically trough cross laminated and graded with cyclic interbeds of pelitic rock; thickest clastic beds commonly contain quartz and feldspar granules, rarely quartz pebbles and chips of pelitic rock. Slump structures and evidence of early post-depositional flowage of sediments common. Unit stippled where sulfide bearing

EXPLANATION

Contact
Dashed where approximately located, short dashed where inferred

Fault, showing dip
Dashed where approximately located

Probable fault

U, upthrown side; D, downthrown side

Anticline
Showing trace of axial plane and probable direction of plunge of axis. Dashed where approximately located or inferred

Syncline
Showing trace of axial plane and probable direction of plunge of axis. Dashed where approximately located or inferred

Overtured anticline
Showing trace of axial plane, direction of dip of limbs, and probable direction of plunge of axis. Dashed where approximately located or inferred

Overtured syncline
Showing trace of axial plane, direction of dip of limbs, and probable direction of plunge of axis. Dashed where approximately located or inferred

Plunge of minor open folds
3-20

Plunge of minor closed folds
Amount of plunge locally not shown

Plan and plunge of minor drag folds
3-20

Strike and dip of beds
Stratigraphic top unknown

Strike and dip of upright beds
70

Strike and dip of overturned beds
70

Strike and dip of vertical beds
Stratigraphic top unknown

Strike and dip of vertical beds
90 on side of stratigraphic top

Strike and dip of foliation
Produced by parallel orientation of lenticular minerals

Strike of vertical foliation

Strike and dip of beds and foliation

Strike of vertical beds and foliation

Bearing and plunge of lineation
Includes mineral alignments, crinkles, crenulations, and intersections of bedding and foliation; presumed to be parallel to axes of major folds. Excludes intersections of slip cleavage with bedding or foliation

Strike and dip of beds and foliation
Bedding or foliation commonly not shown

Strike of vertical beds and foliation
Bedding or foliation commonly not shown

Strike and dip of slip cleavage
Produces prominent crinkles and small folds where intersects bedding and foliation; these features are superimposed on foliation, lineation and folds related to major folding

Strike of vertical slip cleavage

PALEOZOIC

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