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Afghan Geological Survey
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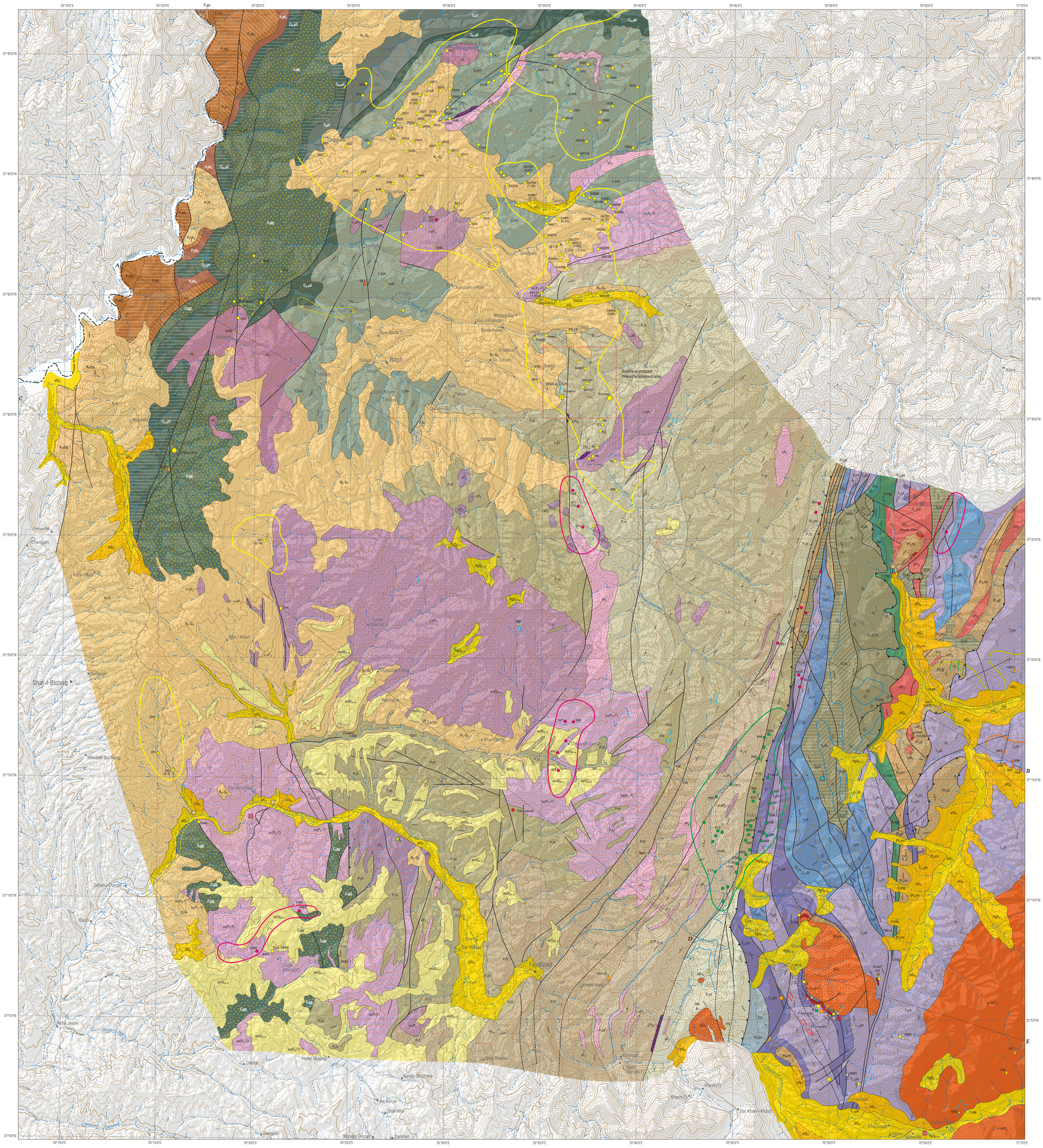

Topography and shaded relief derived from Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) 30-meter Global Digital Elevation Model (GDEM) data, 2009
Hydrography derived from ASTER GDEM data
Projection and grid: Universal Transverse Mercator (UTM), zone 42 north
World Geodetic System (WGS) 1984 Datum
Cultural data from digital files from Afghanistan Information Management Service (*http://www.aims.org.af*)

TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 2014

SCALE 1:100 000
CONTOUR INTERVAL 100 METERS

Modified from original compilation of Semenov and others (1967); see References

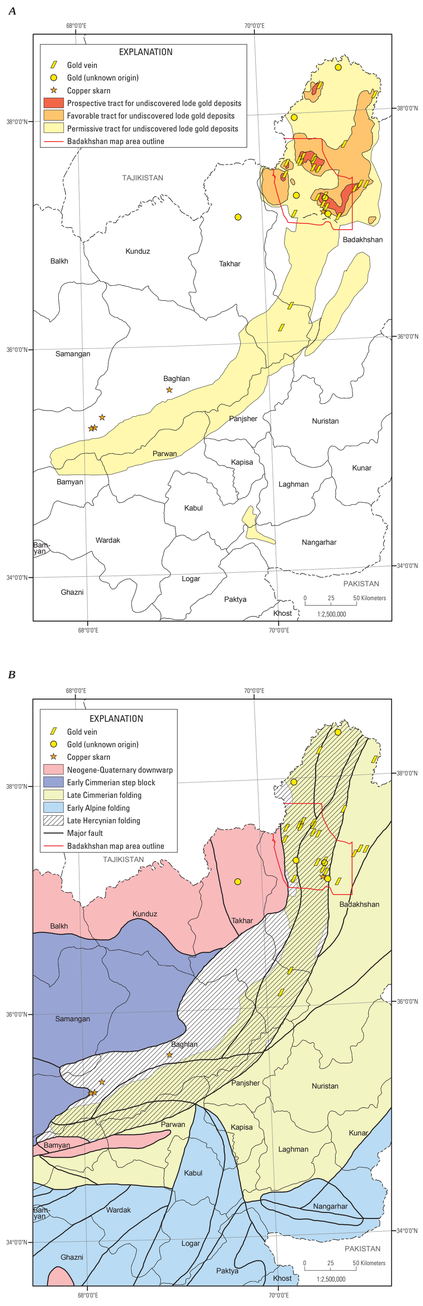

Figure 1.—Northern Afghanistan gold belt, modified from Peters and others (2007), showing abundant gold deposits in Badakhshan Province (***A***). The gold belt is coincident with a zone of late Hercynian folding (***B***).

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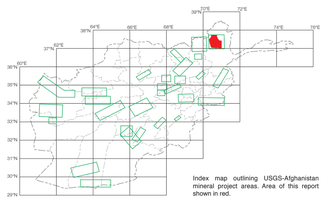


Index map outlining USGS-Afghanistan mineral project areas. Area of this report shown in red.

INTRODUCTION

This map is a combined, redrafted, and modified version of the *Geological map of central Badakhshan*, scale 1:200,000 (sheet 217), and *Map of minerals of central Badakhshan*, scale 1:200,000 (also sheet 217) from Semenov and others (1967). This unpublished Soviet report (no. R0815) contains the original maps and cross sections. The report was prepared in cooperation with the Ministry of Mines and Industries of the Republic of Afghanistan in 1967 under contract no. 1378 (Technoexport, USSR). This work also includes the gold metallogeny summarized in Abdullah and others (1977) and Peters and others (2007, 2011), and additional compilations from Guguev and others (1967).

Badakhshan Province consists of volcanic, sedimentary, and metamorphic rocks of various ages from late Proterozoic to Cenozoic. The rocks are intensively dislocated and cut by intrusions of magmatic rocks. Primary gold occurrences are distinguished in shear zones with hydrothermal alterations or in contact-metasomatic rocks near magmatic intrusions.

The unit colors on the map and cross sections differ from the colors shown on the original version. The units are colored according to the color and pattern scheme of the Commission for the Geological Map of the World (CGMW) (http://www.cgmw.org).

This map reproduces the topology (contacts, faults, and so forth) of the original Soviet maps and cross sections. Elevations on the cross sections are derived from the original Soviet topography and may not match the Global Digital Elevation Model (GDEM) topography used on the current map. We have attempted to translate the original Russian terminology and rock classification into modern English geologic usage as literally as possible without changing any genetic or process-oriented implications in the original descriptions. The map-unit descriptions are from the original Russian map "legend" and the more detailed original stratigraphic column. We also use the age designations from the original map.

DESCRIPTION OF MAP UNITS

STRATIFIED ROCKS

CENOZOIC

- alQ_4 **Alluvial deposits (Holocene)**—Gravel and sand
- $fglQ_4$ **Fluvioglacial deposits (Holocene)**—Rock debris and sand
- $eolQ_{3-4}$ **Eolian deposits (Holocene to Upper Neogene, undivided)**—Loess and loam
- N_2Q_2 **Middle Quaternary to Upper Neogene deposits, undivided**—Boulder-pebble conglomerate, sandy loam, loam, and marl
- alQ_3 **Alluvial deposits (Upper Neogene)**—Gravel, sand, and rare boulders
- $fglQ_{1-3}$ **Fluvioglacial deposits (Upper to Middle Neogene, undivided)**—Rock debris, gravel, sand, rare boulders and blocks
- N_1sd **Tavil Darra suite (Miocene)**—Conglomerate, sandstone, siltstone
- N_1chg **Khingow suite (Miocene)**—Conglomerate with sandy-limy cement, and rare interbeds of siltstone
- P_3tr **Turghan suite (Paleogene system, undivided)**—Andesite-basalt

MESOZOIC

- J_3vr **Wuran Shahr suite (Upper Jurassic)**—Gray, dark-gray, organic-rich limestone with fossils
- $J_{1-2}bl$ **Bulbul suite (Middle and Lower Jurassic, undivided)**—Tan colored, violet siltstone, sandstone, argillite, limestone, coquina
- T_3sh **Shakh Darrah suite (Upper Triassic)**—Brown, green-gray, gray conglomerate, dark sandstone, siltstone and slate with fossils
- $T_{1-3}pn$ **Pain Shahr suite (Middle to Lower Triassic, undivided)**—Conglomerate-breccia, and marmorized limestone

PALEOZOIC

- P_3yl **Yollikhar suite (Permian)**—Volcanogenic siltstone, sandstone, and conglomerate
- P_3gn **Ghun Darra suite (Permian)**—Limy siltstone, gray massive sandstone and limestone
- P_3sd_2 **Safet Darrah suite, upper subsuite (Permian)**—Gray-violet limestone and conglomerate
- P_3sd_1 **Safet Darrah suite, lower subsuite (Permian)**—Coaly-clay slate and dark-gray limy siltstone with interbeds of sandstone and limestone
- P_3sb_2 **Sebi Surkh suite, upper subsuite (Permian)**—Gray, fine-grained, massive, rarely brecciated, limestone; and sandstone
- P_3sb_1 **Sebi Surkh suite, lower subsuite (Permian)**—Siltstone, slate, sandstone, and limestone
- P_3hl **Halqa Jar suite (Permian)**—Amphibolite with interbeds of marble, greenstone schist, porphyritoid, and limestone
- P_3fz **Paydzabad suite (Permian)**—Migmatite, gneiss, schist, marble, amphibolite, greenstone schist, phyllite, and limestone
- P_3rs **Rishab suite (Permian)**—Gneiss, quartz-feldspathic-biotite schist, quartz-sericite-chlorite schist, sericitized schist, and marble
- P_3rb **Rabat suite (Permian)**—Biotitized quartz-feldspar sandstone, quartz-feldspar-biotite schist, sericite-chlorite schist, marble
- C_3zr **Zarich suite (Upper Carboniferous)**—Slate, and black biotitized coaly quartz schist
- $C_{2-3}sl$ **Shalil suite (Upper to Middle Carboniferous, undivided)**—Gray, dark-gray marble with remains of crinoids
- $C_{2-3}cl$ **Chehilqan Shar suite (Upper to Middle Carboniferous, undivided)**—Massive, rarely laminated gray limestone with interbeds of siltstone and sandstone
- C_3hm **Khambel suite (Lower Carboniferous)**—Quartz-feldspar-biotite schist, amphibolitized diabase, tuff, tuff-conglomerate, and marble
- C_3gg **Changar suite (Lower Carboniferous)**—Dark-gray, dirty-gray diabase keratophyre, porphyry, albitophyre, with interbeds and lenses of tuff, slate and limestone; limestone with *Lithostrotion* fossils in the upper part of the suite
- D_3-C_1rh **Rahman suite (Lower Carboniferous to Upper Devonian, undivided)**—Dark-gray, brecciated, thickly and thinly laminated limestone, with remains of *Cyrtospirifer*, *Eomagginifera* sp., *Dielasma* sp., and trilobites
- D_3kc **Kuchi suite (Upper Devonian)**—Dark-gray, gray, ashy, pink limestone, detrital limestone, rare dolomite, and slate. Remains of brachiopods, coral, and bryozoans
- D_2kl **Kalawch suite (Middle Devonian)**—Black, pinkish, yellowish, often bituminous, coaly slate with fossils; and limestone
- Svl **Wular suite (Silurian)**—Brownish-yellow, gray, dark-gray, brecciated, marbled limestone; quartz sandstone, siltstone, slate
- Osk **Sayqan suite (Ordovician)**—Blue-green silty sandstone, pinkish quartzite with trilobite fossils
- $Cmtg$ **Tagarcha suite (Cambrian)**—Pink, red, white, greenish limestone, dolomite, sandstone, and siltstone

PROTEROZOIC

- Et_3mr **Mar Darrah suite (Upper Proterozoic)**—Rhythmic interstratification of pinkish quartz-feldspar sandstone, lilac siltstone with ripple marks. Quartz conglomerate and white quartz sandstone in the upper part of the horizon
- Et_3gl **Gul Darrah suite (Upper Proterozoic)**—Cream-colored, yellowish, light-gray felsic porphyry, ribbon ignimbrite, tuff, tuffaceous sandstone. Below: dark anthracitic limestone, obliquely laminated limy sandstone. Above: cream-colored breccia with admixture of tuffaceous material and limestone

INTRUSIVE ROCKS

- $x\delta_2$ **Syah Jar intrusive complex (Cretaceous)**—Leucocratic porphyry granite
- x-$x\nu Cr_1$ **Baharack intrusive complex (Cretaceous)**—Granodiorite and granite
- $\nu\nu(P_2$-$T)$ **Yaftal intrusive complex (Triassic to Permian)**—Cataclastic granodiorite, plagiogranite, and diorite
- $\nu P_2\beta_3$ **Serpentinite (Permian)**
- νP_2 **Jawza intrusive complex (Permian)**—Granite, granodiorite, and gneissic granite
- νP_2 **Janga intrusive complex (Permian)**—Gabbro and gabbro-diabase
- ν-νP_2 **Janga intrusive complex (Permian)**—Gabbro-diorite, diorite, and plagiogranite
- $\nu \epsilon_1$ **Shangan intrusive complex (Cambrian)**—Diabase, gabbro, and gabbro-diorite
- $x\epsilon_1\gamma_3$ **Dozakh Darrah intrusive complex (Proterozoic)**—Graphic granite, granosyenite, diorite, and gabbro-diabase
- **Magnetite**

ALTERATIONS

- **Hornfels**
- **Skarn**
- **Migmatization**

EXPLANATION OF MAP SYMBOLS

- **Contact**—Dashed where inferred
- **Thrust fault**
  - Gentle, up to 45°
  - Steep, 45° to 90°
- **Fault**—Dashed where inferred
- **Horizon of marble and limestone**—Dashed where inferred
- **Dikes of granite-porphyry**
- **Dikes of diabase and gabbro-diabase**
- **Quartz veins**
- **Strike and dip of bedding**
  - Horizontal
  - Inclined, up to 45°
  - Inclined, 45° to 85°
  - Vertical
  - Overturned
- **Strike and dip of schistosity**
- **Fossil location**
  - Fauna remains
  - Flora remains
- **Non-minable deposit of gold**
- **Ore occurrence**—Sample name and number shown where known
  - Gold
  - Placer gold
  - Worked-out placer gold
  - Area of primitive washing freshet gold
  - Iron
  - Lithium
  - Bauxite
- **Building materials**
  - Granite
  - Gabbro-diabase
  - Limestone
  - Dolomite
  - Quartz sandstone
  - Gravel
- **Heavy concentrate aureoles**
  - Gold
  - Cinnabar
  - Cassiterite
  - Basobismutite

Heavy concentrates—Sample name and number shown where known. Some gold samples show concentration in grams per cubic meter in parentheses. Where cinnabar content is greater than 10 grains, concentration is shown in parentheses

- 2028 (0.33) Gold—3 or more grains
- 377 (12) Cinnabar—3 to 10 grains
- 696 Cassiterite—Rare grains
- 628 Basobismutite—Rare grains

Analysis results of dotted channel samples—Sample name and number shown where known

Gold—Assay results in grams per ton
- 3419 trace–0.1
- 3391 0.2–0.7
- 3385 2.4–3.3

Copper—Spectral results in percent
- 1.0

Molybdenum—Spectral results in percent
- 0.05–0.08
- 0.5

Tungsten—Spectral results in percent
- 0.1
- 0.5

Bismuth—Spectral results in percent
- 0.02
- 3140-5 0.2

Cobalt—Spectral results in percent
- 0.03–0.05

Arsenic—Spectral results in percent
- 3095 1.0 and greater

Analysis results of lump samples—Sample number shown where known

Gold—Assay results in grams per ton
- 872 trace–0.1
- 740 0.2–1.0

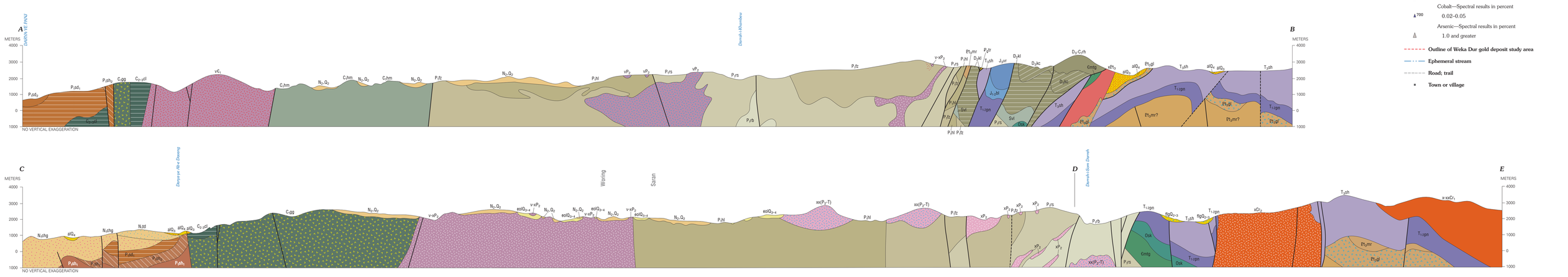
Copper—Spectral results in percent
- 167 1.0 and greater

Tin—Spectral results in percent
- 55 1.0

Cobalt—Spectral results in percent
- 700 0.02–0.05

Arsenic—Spectral results in percent
- 1.0 and greater

- **Outline of Weka Dur gold deposit study area**
- **Ephemeral stream**
- **Road; trail**
- **Town or village**



Geologic Map of Metallic and Nonmetallic Mineral Deposits, Badakhshan Province, Afghanistan, Modified from the 1967 Original Map Compilation of G.G. Semenov and Others

Compiled by
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2014

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